ICD 08240

Amateur Radio

CQ

Serving Amateur Radio Since 1945

October 1977
$1.25

Results of the 18th Annual CQ 160 Meter DX Contest...p.25

CQ Reviews: The Alpha/Vomax SBP-3 Split Band Speech Processor...p.58

CQ Reviews: The SST-1 Antenna Tuner...p.30

The Receiver That Started It All- The SW-2...p.18

nateur's Journal

KENWOOD'S

NEW TS-520S

AND DG-5 DIGITAL FREQUENCY DISPLAY

A NEW STANDARD IN ECONOMY TRANSCEIVERS

The NEW TS-520S combines all of the fine, field-proven characteristics of the original TS-520 together with many of the ideas, comments, and suggestions for improvement from amateurs worldwide. Kenwood's ultimate objectives . . . to make quality equipment available at reasonable prices.

FULL COVERAGE TRANSCEIVER

The new TS-520S provides full coverage on all amateur bands from 1.8 to 29.7 MHz. Kenwood gives you 160 meter capability, WWV on 15.000 MHz., and an auxiliary band position for maximum flexibility. And with the addition of the TV-502 and TV-506 transverters, your TS-520S can cover 160 meters to 2 meters on SSB and CW.

DIGITAL DISPLAY DG-5 (option)

The new Kenwood DG-5 provides easy, accurate readout of your operating frequency while transmitting *and* receiving.

OUTSTANDING RECEIVER SENSITIVITY AND MINIMUM CROSS MODULATION

The new TS-520S incorporates a 3SK-35 dual gate MOSFET for outstanding cross modulation and spurious response characteristics. The 3SK35 has a low noise figure (3.5 dB typ.) and high gain (18 dB typ.) for excellent sensitivity.

NEW IMPROVED SPEECH PROCESSOR

A new audio compression amplifier gives you extra punch in the pile ups and when the going gets rough.

VERNIER TUNING FOR FINAL PLATE CONTROL

A new vernier tuning mechanism allows easy and accurate adjustment of the plate control during tune-up.

FINAL AMPLIFIER

The new TS-520S is completely solid state except for the driver (12BY7A) and the final tubes. Rather than substitute TV sweep tubes as final amplifier tubes in a state of the art amateur transceiver, Kenwood has employed two husky S-2001A (equivalent to 6146B) tubes. These rugged, time-proven tubes are known for their long life and superb linearity.

HIGHLY EFFECTIVE NOISE BLANKER

An effective noise blanking circuit developed by Kenwood that virtually eliminates ignition noise is built-in to the TS-520S.

RF ATTENUATOR

The new TS-520S has a built-in 20 dB attentuator that can be activated by a push button switch conveniently located on the front panel.

VFO-520 — NEW REMOTE VFO

The VFO-520 remote VFO has been designed to match the styling of the TS-520S and provide maximum operating flexibility on the band selected on your TS-520S.

AC POWER SUPPLY

The TS-520S is completely self-contained with a rugged AC power supply built-in. The addition of the DS-1A DC-DC converter (option) allows for mobile operation of the TS-520S.

EASY CONNECTION PHONE PATCH

The TS-520S has 2 convenient RCA phono jacks on the rear panel for PHONE PATCH IN and PHONE PATCH OUT.

CW-520 — CW FILTER (OPTION)

The CW-520 500 Hz filter can be easily installed and will provide improved operation on CW.

AMPLIFIED TYPE AGC CIRCUIT

The AGC circuit has 3 positions (OFF, FAST, SLOW) to enable the TS-520S to be operated in the optimum condition at all times whether operating CW or SSB.

The TS-520S retains all of the features of the original TS-520 that made it tops in its class: RIT control • 8-pole crystal filter • Built-in 25 KHz calibrator • Front panel carrier level control • Semi-break-in CW with sidetone • VOX/PTT/MOX • TUNE position for low power tune up • Built-in speaker • Built-in Cooling Fan • Provisions for 4 fixed frequency channels • Heater switch.

Specifications

Amateur Bands: 160-10 meters plus WWV (receive only)
Modes: USB, LSB, CW
Antenna Impedance: 50-75 Ohms
Frequency Stability: Within ±1 kHz during one hour after one minute of warm-up, and within 100 Hz during any 30 minute period thereafter
Tubes & Semiconductors:
Tubes 3
(S2001A x 2, 12BY7A)
Transistors 52
FETs 19
Diodes 101
Power Requirements: 120/220 V AC, 50/60 Hz, 13.8 V DC (with optional DS-1A)
Power Consumption: Transmit: 280 Watts Receive: 26 Watts (with heater off)
Dimension: 333(13⅛) W x 153 (6-0) H x 335(13-(13-3/16) D mm(inch)
Weight: 16.0 kg(35.2 lbs)

TRANSMITTER
RF Input Power: SSB: 200 Watts PEP CW: 160 Watts DC
Carrier Suppression: Better than -40 dB
Sideband Suppression: Better than -50 dB
Spurious Radiation: Better than -40 dB
Microphone Impedance: 50k Ohms
AF Response: 400 to 2,600 Hz

RECEIVER
Sensitivity: 0.25 uV for 10 dB (S+N)/N
Selectivity: SSB:2.4 kHz/-6 dB, 4.4 kHz/-60 dB
Selectivity: CW: 0.5 kHz/-6 dB, 1.5 kHz/-60 dB (with optional CW-520 filter)
Image Ratio: Better than 50 dB
IF Rejection: Better than 50 dB
AF Output Power: 1.0 Watt (8 Ohm load, with less than 10% distortion)
AF Output Impedance: 4 to 16 Ohms

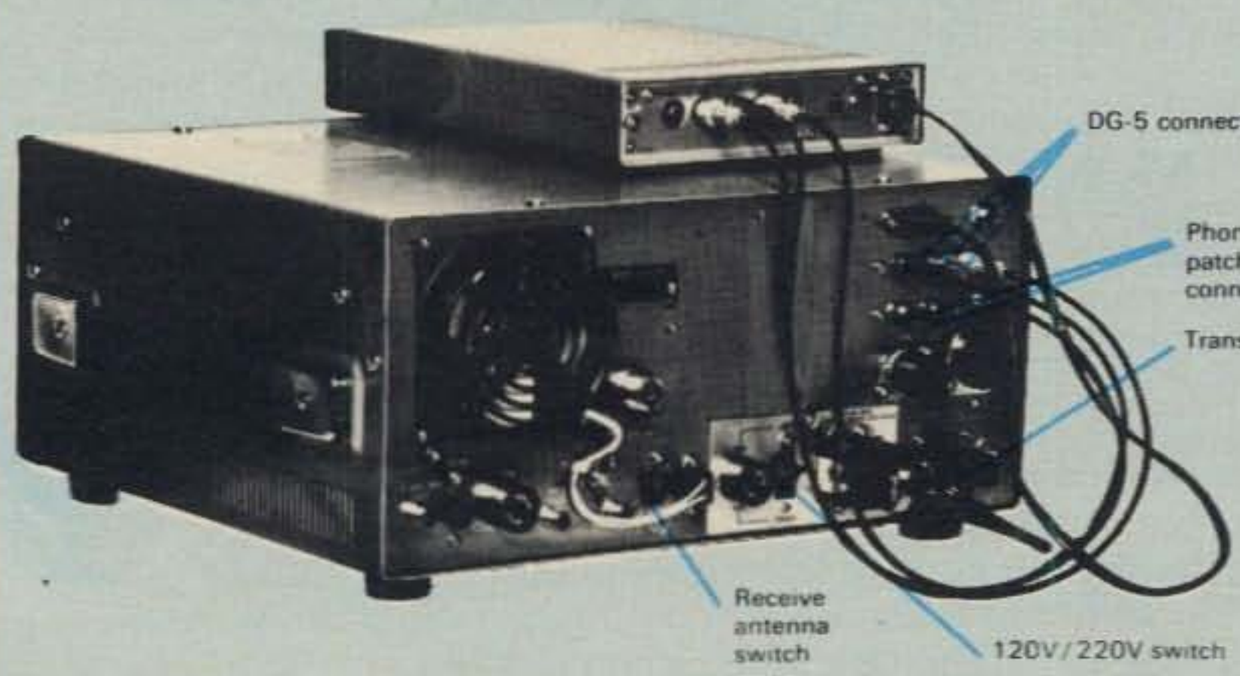
DG-5

SPECIFICATIONS
Measuring Range: 100 Hz to 40 MHz
Input Impedance: 5 k Ohms
Gate Time. 0.1 Sec.
Input Sensitivity: 100 Hz to 40 MHz ... 200 mV rms or over, 10 kHz to 10 MHz .. 50 mV or over
Measuring Accuracy: Internal time base accuracy ±0.1 count
Time Base: 10 MHz
Operating Temperature: -10° to 50° C/14° 122° F
Power Requirement: Supplied from TS-520S or 12 to 15 VDC (nominal 13.8 VDC)
Dimensions: 167(6-9/16) W x 43(1-11/16) H x 268(10-9/16) D mm(inch)
Weight: 1.3 kg(2.9 lbs)

DG-5
(optional)

The luxury of digital readout is available on the TS-520S by connecting the new DG-5 readout (option). More than just the average readout circuit, this counter mixes the carrier, VFO, and heterodyne frequencies to give you your exact frequency. This handsomely-styled accessory can be set almost anyplace in your shack for easy to read operation . . . or set it on the dashboard during mobile operation for safety and convenience. Six bold digits display your operating frequency while you transmit and receive. Complete with DH (display hold) switch for frequency memory and 2 position intensity selector. The DG-5 can also be used as a normal frequency counter up to 40 MHz at the touch of a switch. (Input cable provided.)

NOTE: TS-520 owners can use the DG-5 with a DK-520 adapter kit.



TRIO-KENWOOD COMMUNICATIONS INC. 1111 WEST WALNUT/COMPTON, CA 90220

KENWOOD
...pacesetter in amateur radio

NEW

TS-700S

WITH DIGITAL FREQUENCY DISPLAY

Kenwood has done it again! We've combined the fine, time-proven characteristics of the original TS-700A together with many of the ideas and comments for improvement from amateurs worldwide. Check out the new "built-ins": digital readout, receiver pre-amp, VOX, semi-break in, and CW sidetone! Of course, it's still all mode, 144-148 MHz and VFO controlled.

Features: Digital readout with "Kenwood Blue" digits • high gain receiver pre-amp • 1 watt low power switch • built in VOX • semi-break in on CW • CW sidetone • Operates all modes: SSB (upper & lower), FM, AM and CW • Completely solid state circuitry provides stable, long lasting, trouble-free operation • AC and DC capability (operate from your car, boat, or as a base station through its built-in power supply) • 4 MHz band coverage (144 to 148 MHz) • Automatically switches transmit frequency 600 KHz for repeater operation. Simply dial in your receive frequency and the radio does the rest . . . simplex, repeater, reverse • Or accomplish the same by plugging a single crystal into one of the 11 crystal positions for your favorite channel • Transmit/Receive capability on 44 channels with 11 crystals.

VFO-700S

The perfect companion to the TS-700S! This handsomely styled unit provides you with extra versatility and the luxury of having a second VFO in your shack.

Great for split frequency operation and for tuning off frequency to check the band.

The function switch on the VFO-700S selects the VFO in use and the appropriate frequency is displayed on the digital readout in the TS-700S. In addition, a momentary contact "frequency check" switch allows you to spot check the frequency of the VFO not in use.

TRIO-KENWOOD COMMUNICATIONS INC.
1111 WEST WALNUT/COMPTON, CA 90220

KENWOOD
...pacesetter in amateur radio

OCTOBER, 1977 VOL. 33, NO. 10

CQ

The Radio Amateur's Journal

FEATURES

DEPARTMENTS

Offices: 14 Vanderventer Avenue, Port Washington, L.I., N.Y. 11050. Telephone: 516-883-6200

CQ (Title registered U.S. Post Office) is published monthly by Cowan Publishing Corp. Second Class Postage paid at Port Washington, N.Y. and other points. Subscription Prices one year, $7.50; two years $13.00. Allow six weeks for change of address. Printed in the United States of America.

Postmaster: Please send form 3579 to CQ Magazine, 14 Vanderventer Ave., Port Washington, L.I., N.Y. 11050

This NEW MFJ Super Antenna Tuner . . .

matches <u>everything</u> from 160 thru 10 Meters: dipoles, inverted vees, random wires, verticals, mobile whips, beams, balance lines, coax lines. Up to 200 watts RF <u>OUTPUT</u>. Built-in balun, too!

$69.95

With the NEW MFJ Super Antenna Tuner you can run your full transceiver power output — up to 200 watts RF power output — and match your transmitter to **any** feedline from 160 thru 10 Meters whether you have coax cable, balance line, or random wire.

You can tune out the SWR on your dipole, inverted vee, random wire, vertical, mobile whip, beam, quad, or whatever you have.

You can even operate all bands with just one existing antenna. No need to put up separate antennas for each band.

Increase the usable bandwidth of your mobile whip by tuning out the SWR **from inside your car.** Works great with all solid state rigs (like the Atlas) and with all tube type rigs.

It travels well, too. Its ultra compact size 5x2x6 inches fits easily in a small corner of your suitcase.

The secret of this tiny, powerful tuner is a wide range 12 position variable inductor made from two stacked toroid cores and high quality capacitors manufactured especially for MFJ. For balanced lines a 1:4 (unbalanced to balanced) balun is built-in. Made in U.S.A. by MFJ Enterprises.

This beautiful little tuner is housed in a deluxe eggshell white Ten-Tec enclosure with walnut grain sides.

SO-239 coax connectors are provided for transmitter input and coax fed antennas. Quality five way binding posts are used for the balance line inputs (2), random wire input (1), and ground (1).

Try it — no obligation. If not delighted, return it within 30 days for a refund (less shipping). This tuner is unconditionally guaranteed for one year.

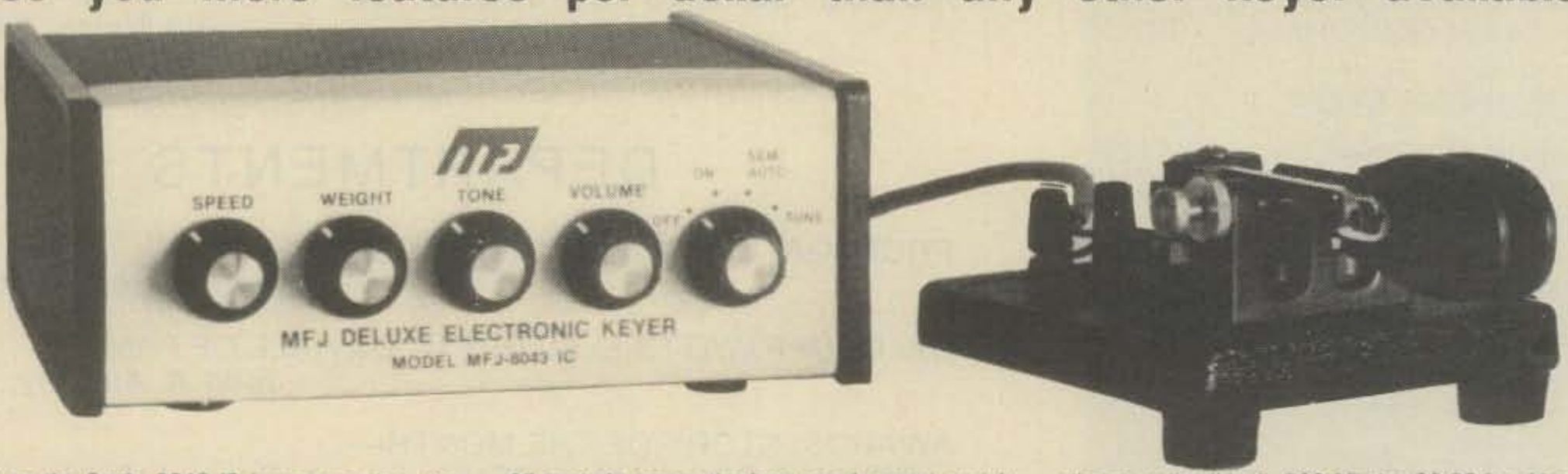
To order, simply call us **toll-free 800-647-8660** and charge it on your BankAmericard or Master Charge or mail us an order with a check or money order for $69.95 plus $2.00 shipping/handling for the MFJ-16010ST Super Antenna Tuner.

Don't wait any longer to tune out that SWR and enjoy solid QSO's. Order today.

MFJ ENTERPRISES
P. O. BOX 494
MISSISSIPPI STATE, MS. 39762
CALL TOLL FREE. . 800-647-8660

This NEW MFJ Deluxe Keyer at $69.95 . . .

gives you more features per dollar than any other keyer available.



Based on the Curtis 8043 IC keyer-on-a-chip, the new MFJ Deluxe Keyer gives you more features per dollar than any other keyer available.

Sends iambic, automatic, semi-automatic, manual. Use squeeze, single lever or straight key.

Iambic squeeze key operation with dot and dash insertion lets you form characters with minimal wrist movement for comfortable, fatique-free sending.

Semi-automatic "bug" operation provides automatic dots and manual dashes. Use a manual straight key to safely key your transmitter or to improve your fist.

Dot memory, self-completing dots and dashes, jam-proof spacing and instant start for accurate and precise CW.

Totally RF proof. No problems, whatever.

Ultra-reliable solid-state keying. Keys virtually any transmitter: grid block, −300V max., 10 ma, max.; cathode and solid state transmitters + 300V max., 200 ma, max.

All controls are on the front panel: speed, weight, tone, volume, function switch. Smooth linear speed control. 8 to 50 WPM.

Weight control lets you adjust dot dash space ratio; makes your signal distinctive to penetrate thru heavy QRM for solid DX contacts.

Tone control. Room filling volume. Built-in speaker. Ideal for classroom teaching.

Function switch selects off, on, semi-automatic/manual, tune. Tune keys xmtr for tuning.

Completely portable. Take it anywhere. Operates up to a year on 4 C-cells. Miniature phone jack for external power (3 to 15 VDC).

Beautiful Ten Tec enclosure. Eggshell white, walnut sides. Compact 6x6x2 inches.

Three conductor quarter-inch phone jack for key, phono jacks for keying outputs.

Optional squeeze key. Dot and dash paddles have fully adjustable tension and spacing for the exact "feel" you like. Heavy base with non-slip rubber feet eliminates "walking". $29.95 plus $2.00 for shipping and handling.

Try it—no obligation. If not delighted, return it within 30 days for a refund (less shipping). This keyer is unconditionally guaranteed for one year.

To order, simply call us **toll-free 800-647-8660** and charge it on your BankAmericard or Master Charge or mail us an order with a check or money order for $69.95 plus $2.00 shipping/handling for the MFJ-8043 keyer and/or $29.95 plus $2.00 shipping/handling for the squeeze key.

Don't wait any longer to enjoy the pleasures of the new MFJ Deluxe Keyer. Order today.

MFJ ENTERPRISES
P. O. BOX 494
MISSISSIPPI STATE, MS. 39762
CALL TOLL FREE. . 800-647-8660

Zero Bias

an editorial

Our cover photo this month is of Herb Schoenbohm's KV4FZ QTH at Fort Louise Agusta, in the U.S. Virgin Islands. The house was built during the French rule of St. Croix during the 18th century and rebuilt by the Danes in the 19th century. It originally served as a coastal gun battery for the French and as a check-point for boats entering St. Croix harbor at Christiansted. The large tower is 308 feet high and the two smaller towers are 70' and 50' high. This location is responsible for a few big CQ contest records. By the way, the photo was taken by Chip, K7VPF, who operated KV4FZ during several recent contests and was also a big winner in CQ's 1976 WW DX C.W. Contest operating KP4AST.

One of the leading problems that face amateurs and CBers alike is the problem of interference. Interference, in fact, is probably the chief factor in recent happenings within the FCC. The FCC's proposals for type acceptance and tightening the regulations on spurious signals produced by linear amplifiers attest to the serious nature of the problem. It seems to be a concerted rush to do something, anything, just to get control of a situation that seems totally out of control.

With type acceptance the FCC hopes to control the sale and availability of equipment capable of radiating a signal or producing interference. This is the only legal lever the FCC can press at the moment to solve the problem. Legally, if equipment is subject to FCC type acceptance and does not meet the standards set up then that equipment cannot be legally sold nor advertised nor distributed in this country. The FCC hopes to use this form of pressure in a positive sense to screen out faulty equipment and not in a punitive way of restricting commerce. It's not that easy to differentiate sometimes.

We all know full well the impact CB radio has made on the "American way of life". We can all bandy about astronomical numbers of devotees who crowd the airways all day and night talking to their friends. If we add to that our ever increasing number of amateurs, (the number is steadily increasing for the first time in years) who also talk to their friends among other things, we can begin to think of the total number of discrete devices tossing our r.f. in every direction each and every hour of the day. We are now talking about a very large problem. This r.f. is finding its way into the homes of "Mr. and Mrs. America" and they don't like it one bit! Where this r.f. is eminating from is anybody's guess. The harmonic multiples are endless and there are even products falling out where there isn't even an apparent multiple. Antennas radiate, chassis radiate, everything radiates energy that is being received in some form by all types of entertainment devices found in the home. Each month the FCC receives thousands of complaints of interference from people who feel that since they spent hundreds or thousands of dollars on their super whatever, they're entitled legally to listen to or watch whatever they please instead of the guy next door. They don't want to know that perhaps the fault may lie with their own equipment. Maybe it really doesn't lie with their equipment at all. With all those millions of transmitters and amplifiers out there the problem may simply be one of tremendous fundamental overload in their front-ends.

Whatever the cause of interference may be the results are the same. People are annoyed. Who can we place the blame on? Amateurs can always take the easy road out and blame the CBer. To some degree this is true: It is true in that numerically there are considerably more CBers with transmitters radiating than amateurs. On the other side of the coin, most recipients of interference cannot tell the difference between amateur radio and CB radio so many complaints of CB radio interference are probably caused by amateurs. It's small consolation and even a smaller benefit in the long run.

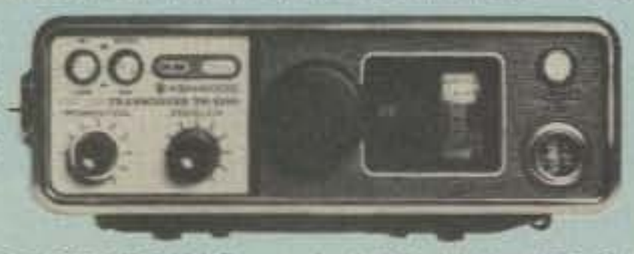
The FCC in attempting to handle previous CB problems and enforce existing legislation found that they really couldn't make much of a dent in the problem. The numbers were too great to treat effectively in any strict legal sense and so there was a tacit "legalization" of CB operation. Now that the problem of interference has become so rampant in many areas the FCC is at another choice-point in what they can do. The important thing to remember is what the FCC "can do" is not necessarily what they would "like to do". They obviously cannot recommend living with the problem and making the best of it. They certainly cannot legalize it!

This brings us to the point of this new effort to type accept amateur equipment and to increase by 20 dB the second order harmonic product of amateur linear amplifiers. This is a two pronged attack on the problem. First, the FCC hopes to "clean up" any interference caused by amateurs. Secondly, they realize that a lot of amateur equipment is falling into the hands of CBers and "unofficially" they feel that if this practice goes on at least the CBer will have "clean" equipment to use (however illegal this may be). At a recent

(continued on page 95)

WHO ELSE BUT KENWOOD

WHO ELSE BUT KENWOOD CARES ENOUGH TO OFFER FINE AMATEUR RADIO GEAR IN ALL THREE SEGMENTS OF THE RF SPECTRUM . . . *HF, VHF, AND NOW UHF.* EQUIPMENT FOR THE NOVICE JUST COMING UP FROM CB TO THE EXTRA CLASS "OLD TIMER", PORTABLE, MOBILE OR BASE STATION, 2 METER OR 6 METER OR EVEN THE SPECIAL INTEREST OPERATOR WHO WANTS A "KENWOOD" QUALITY 450 MHz RIG LIKE THE *TR-8300**. A DEDICATION TO DESIGNING AND BUILDING THE VERY FINEST EQUIPMENT POSSIBLE . . . A DEDICATION TO INNOVATIVE ENGINEERING BACKED BY A SOLID SERVICE POLICY . . . A DEDICATION TO GIVING YOU MORE SATISFACTION FOR EVERY DOLLAR YOU SPEND . . WHO ELSE BUT KENWOOD ★★★★★★ *THE PACESETTER IN AMATEUR RADIO.*



*THE TR-8300 IS KENWOOD'S NEWEST OFFERING . . . A 450 MHz MOBILE/BASE STATION RUNNING 10 WATTS WITH 22 CHANNEL CAPABILITY.

THE PEOPLE WHO SELL KENWOOD

ALTHOUGH EVERY KENWOOD PRODUCT LINE IS CAREFULLY MANUFACTURED, FACTORY TESTED AND TESTED AGAIN UPON ARRIVAL IN OUR CALIFORNIA FACILITY, A UNIT MAY NEED SERVICE AT SOME FUTURE DATE. IN ORDER TO GUARANTEE THE BEST LOCAL SERVICE NATIONWIDE, KENWOOD HAS CAREFULLY SCREENED AND CHOSEN A SELECT GROUP OF DEALERS WHOSE SALES AND SERVICE PERSONNEL ARE THOROUGHLY FAMILIAR WITH KENWOOD PRODUCTS, WHO STOCK THE CORRECT PARTS, WHO ARE KEPT UP TO DATE ON SERVICING TECHNIQUES AND WHO, OF COURSE, HAVE THE SOLID BACKING OF KENWOOD'S FACTORY TRAINED STAFF.

WHEN YOU BUY YOUR KENWOOD PRODUCT FROM AN *AUTHORIZED KENWOOD DEALER* YOU CAN BUY WITH CONFIDENCE.

FOLLOWING IS A LIST OF AUTHORIZED DEALERS.

(As of May 31 1977)

ARIZONA

Power Communications*
6012 North 27th Ave.
Phoenix, AZ 85017

ALABAMA

Long's Electronics
3521 10th Ave. North
Birmingham, AL 35234

CALIFORNIA

Gary Radio
8199 Clairemont Mesa Blvd
San Diego, CA 92112

Ham Radio Outlet
999 Howard Ave.
Burlingame, CA 94010

Ham Radio Outlet
13754 Victory Blvd.
Van Nuys, CA 91401

Henry Radio, Inc.
11240 West Olympic Blvd.
Los Angeles, CA 90064

Henry Radio, Inc.
931 North Euclid
Anaheim, CA 92801

Webster Radio
2602 East Ashlan
Fresno, CA 93726

COLORADO

CW Electronics
1401 Blake St.
Denver, CO 80202

FLORIDA

Amateur Electronic Supply
621 Commonwealth
Orlando, FL 32803

Amateur Radio Center
2805 N.E. Second Ave.
Miami, FL 33137

Grice Electronics
320 East Gregory St.
Pensacola, FL 32501

HAWAII

Lafayette Radio Company
1111 Mc Cully St.
Honolulu, HI 96814

ILLINOIS

Erickson Communications
5935 North Milwaukee Ave.
Chicago, IL 60646

Klaus Radio, Inc.
8400 North Pioneer Parkway
Peoria, IL 61614

INDIANA

Graham Electronics
133 South Pennsylvania
Indianapolis, IN 46240

Hoosier Electronics
43 B Meadows Shopping Center
Terre Haute, IN 47802

IOWA

HI, Inc.
1601 Avenue "D"
Council Bluffs, IA 51501

KANSAS

Associated Radio Comm.
8012 Conser
Overland Park, KS 66204

MAINE

Craig Radio Company
Route 1 By-Pass South
Kittery, ME 03904

MARYLAND

Electronic International Service
11305 Elkin St.
Wheaton, MD 20902

Professional Electronics
1710 Joan St.
Baltimore, MD 21204

MICHIGAN

Electronic Distributors
1960 Peck St.
Muskegon, MI 49441

Radio Supply & Engineering
1207 W. 14 Mile Rd.
Clawson, MI 48017

MINNESOTA

Electronic Center
127 Third Ave. North
Minneapolis, MN 55401

MISSOURI

Ham Radio Center
8342 Olive Blvd.
St. Louis, MS 63132

Henry Radio Company
211 North Main St.
Butler, MS 64730

Midcom Electronics, Inc.
2506 South Brentwood Blvd
St. Louis, MS 63144

MONTANA

Conley Radio Supply
318 North 16th St.
Billings, MT 59101

NEW MEXICO

Electronic Module
601 North Turner
Hobbs, NM 88240

NEW YORK

Adirondack Radio Supply
185 West Main St.
Amsterdam, NY 12012

Harrison Radio Corporation
20 Smith St.
Farmingdale, L.I., NY 11735

NORTH CAROLINA

Freck Radio Supply
252 Patton Ave.
Asheville, NC 28801

Vickers Electronics
500 East Main St.
Durham, NC 27702

OHIO

Amateur Electronic Supply
17929 Euclid Ave.
Cleveland, OH 44112

Srepco Electronics
314 Leo St.
Dayton, OH 45404

OKLAHOMA

Derrick Electronics
714 West Kenosha
Broken Arrow, OK 74012

Radio Inc.
1000 South Main
Tulsa, OK 74119

OREGON

Portland Radio Supply
1234 S.W. Stark St.
Portland, OR 97205

PENNSYLVANIA

Electronic Exchange
136 Main St.
Souderton, PA 18964

Hamtronics
4033 Brownsville Rd.
Trevose, PA 19047

JRS Distributors
646 West Market St.
York, PA 17404

SOUTH CAROLINA

Accutek, Inc.
420 Laurens Rd.
Greenville, SC 29607

SOUTH DAKOTA

Burghardt Amateur Center
124 First Ave. N.W.
Watertown, SD 57201

TENNESSEE

Sere-Rose & Spencer Elec.
1465 Wells Station Rd.
Memphis, TN 38108

TEXAS

AGL Electronics*
3068 Forest Lane #309
Dallas, TX 75234

Douglas Electronics
1118 South Staples
Corpus Christi, TX 78404

Electronics Center
2929 North Haskell
Dallas, TX 75204

Madison Electronics
1508 McKinney Ave.
Houston, TX 77002

UTAH

Manwill Supply Company
2780 South Main St.
Salt Lake City, UT 84115

WASHINGTON

ABC Communications
17541 15th Ave. N.E.
Seattle, WA 98155

Amateur Radio Supply Company
6213 — 13th Ave. South
Seattle, WA 98108

WISCONSIN

Amateur Electronic Supply
4828 West Fond Du Lac Ave.
Milwaukee, WI 53216

*Pending

IO-KENWOOD COMMUNICATIONS INC. 1111 WEST WALNUT/COMPTON, CALIFORNIA 90220

KENWOOD
...pacesetter in amateur radio

the TEMPO 2020

...an accepted and proven performer

- Phase lock-loop (PLL) oscillator circuit minimizes unwanted spurious responses.
- Hybrid Digital Frequency Presentation.
- Advanced Solid-state design...only 3 tubes.
- Built-in AC and 12 VDC power supplies.
- CW filter standard equipment...not an accessory.
- Rugged 6146-B final amplifier tubes.
- Cooling fan standard equipment...not an accessory.
- High performance noise-blanker is standard equipment...not an accessory.
- Built-in VOX and semi-break in CW keying.
- Crystal Calibrator and WWV receiving capability.
- Microphone provided.
- Dual RIT control allows both broad and narrow tuning.
- All band 80 through 10 meter coverage.
- Multi-mode USB, LSB, CW and AM operation.
- Extraordinary receiver sensitivity (.3u S/N 10 db) and oscillator stability (100 Hz 30 min. after warm-up)
- Fixed channel crystal control on two available positions.
- RF Attenuator.
- Adjustable ALC action.
- Phone patch in and out jacks.
- Separate PTT jack for foot switch.
- Built-in speaker.
- The TEMPO 2020...$759.00.
- Model 8120 external speaker...$29.95. Model 8010 remote VFO...$139.00.

Send for descriptive information on this fine new transceiver, or on the time proven Tempo ONE transceiver which continues to offer reliable, low cost performance

AVAILABLE AT SELECT DEALERS THROUGHOUT THE U.S.

Henry Radio

11240 W. Olympic Blvd., Los Angeles, Calif. 90064 213/477-6701
931 N. Euclid, Anaheim, Calif. 92801 714/772-9200
Butler, Missouri 64730 816/679-3127

Prices subject to change without notice.

think of yourself as an antenna expert!
—you select your components!

1. Get optimum performance band for band. Choose from medium or high power resonators for your favorite bands.

2. Fold over, 360° swivel mast for quick band change or easy garaging. Select from two versions, fender/deck or bumper mount location.

3. Stainless steel ball mount, 180° adjustable, commercial duty for superior mechanical and electrical performance.

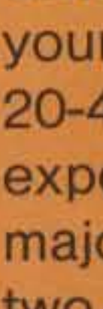
4. Get exceptional reports, broadest bandwidth, lowest SWR. Use with any convenient length 50 ohm coax. Matching devices not required.

5. For convenience, use the Hustler stainless steel resonator spring, and special design quick disconnect.

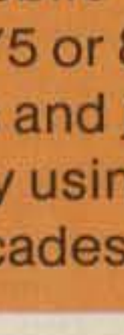
...and you'll mobile with the experts' foremost choice... HUSTLER®

Get fixed station reports from your mobile—operate 6-10-15-20-40-75 or 80 meters with the experts and join the vast majority using Hustler for nearly two decades.

Model SSM-2 Ball Mount



Model QD-1
Quick Disconnect



Model RSS-2
Resonator Spring

Model BM-1
Bumper Mount

Model L-14-240
Mil Spec
50 Ohm Feedline

Model MO-1
For Deck or
Fender
Location

Model MO-2
For Bumper
Mount
Location

Super
Resonators
RM(S)
2 KW PEP
Greatest Coverage

Standard
Resonators
RM
400 Watts PEP

"the home of originals"

HUSTLER®

Available from all distributors who recognize the best.

new-tronics corporation
15800 Commerce Park Drive
Brookpark, Ohio 44142
(216) 267-3150

HUSTLER ANTENNA PRODUCTS—for sixteen years—original designs—created and manufactured by American ingenuity, labor and materials—used by communicators throughout the world.

Hustler designs are patented under one or more of the following assigned to New-Tronics Corporation 3287732, 3513472, 3419869, 3873985, 3327311, 3599214, 3582951.

Announcing

• **North Brunswick, NJ** — The Boy Scouts of America are sponsoring their annual Scout Jamboree on October 15th and 16th. Some of last years prefixes showing up on the annual Scout Jamboree-on-the-Air were: CR6, ZD8, V55, TJ, VK9X, ZK1, OY, 3DZ, VS6, 9K2, 9M2, 9M6, FU8, 9V1, just to name a few. Scout stations from those countries and 78 more participated in the World Scout Bureau sponsored by JOTA, almost DXCC. As of last year, all modes will be in use: code, phone, RTTY, SSTV, and satellite bounce. CB stations can pass along Scout greeting, too. K2BSA will send participants certificates to all operators, ham or CB, to short wave listeners. For more info, contact The National Office of the Boy Scouts of America, North Brunswick, NJ 08902 or call (201) 249-6000, TWX (710) 480-6262.

• **Hudson, NY** — The Northeastern States 160 Meter Amateur Radio Association will hold their annual election and banquet on Saturday, October 8th at Kozel's tavern, 5 miles northeast of Hudson on Route 9H. Flea market in rear parking lot at 1 p.m. Dinner at 6 p.m. For further info, contact W1EUB, Secretary Treasurer on 160 or write: Robert Flynn, W1EUB, 39 Arlington St., Pittsfield, Mass. 01201.

• **Taylor, MI** — The Repeater Association of Downriver Amateur Radio (R.A.D.A.R.) Hamfest will be held on October 16, 1977 at the Kennedy High School on Northline Road east of Telegraph (U.S. 24). Talk-in will be on 52/52, 34/94, 93/33. Door prizes and food. Admission is $2.00/YLs free. Reserved tables are $1.00. Doors open at 9 a.m. and close at 3 p.m. For further info, contact R.A.D.A.R., Inc., Box 1023, Southgate, MI 48195.

• **East Rutherford, NJ** — The Knight Raiders VHF Club, K2DEL, presents its annual auction and flea market on Saturday October 8th, 1977 at St. Joseph's Church. Doors open at 10 a.m. Free admission and free parking. Talk-in on 146.52. For further info, contact Bob Kovaleski, (201) 473-7113, evenings only; or write to The Knight Raiders VHF Club, Inc., P.O. Box 1054, Passaic, NJ 07055.

• In celebration of Queen Elizabeth's Silver Jubilee, English stations used the prefix "GE" between the periods of 0001 GMT thru 2359 GMT, June 4th thru June 12th. The Bromsgrove Radio Club sponsored the Silver Jubilee Award. To qualify for the award, you must work the "GE" prefix plus the key station GE3VGG. To receive your copy of this award, send a transcript of your log endorsed by another licensed amateur plus $1.00 U.S. money or 4 IRCs to: Mr. J.K. Harvey, G8KLO, 22 Elm Grove, Bromsgrove, United Kingdom B61 0EH. The deadline is December 31, 1977.

• **Warrington, PA** — The Mt Airy VHF Radio Club (the Packrats) are holding "Hamarama '77" at the Bucks County Drive-In Theater, Route 611 (Easton Road) on Sunday Oct. 2nd, 1977, from 8 a.m. to 4 p.m., rain or shine. Registration is $1.50 , tailgating $2.00/space (bring your own table). Talk-in via W3CCX/3 on 52.525 and 146.52, WR3ACD on 222.98/224.58, WR3ADS on 147.63/147.03, and WR3AHC on 147.60/147.00. Advanced registration to the Mid-Atlantic States VHF Conference which includes admission to Hamarama. For infor, contact Ron Whitsel, WA3AXV, Chairman, P.O. Box 353, Southampton, PA 18966, phone (215) 355-5730.

• **Willow Grove, PA** — The Mid-Atlantic States VHF Conference will be held on Saturday, Oct. 1st, 1977 at the Treadway Inn on Easton Road (Rt. 611, Exit 27 on the PA Turnpike) on the day before Hamarama '77 (at nearby Warrington, PA). Advance registration is $2.50 which includes admission to Hamarama on Sunday. Buffet dinner at 7:30 p.m. is $8.00. For advanced registration contact WA3AXV, Ron Whitsel, chairman, P.O. Box 353, Southampton, PA 18966, phone (215) 355-5730.

• **Yonkers, NY** — The YARC Hamfest will be held on October 9th, 1977 from 9 a.m. to 6 p.m. at the Redmond Field, Cooke Ave. Buyers $1.00, sellers $3.00. Bring your own table. Door prizes, auction, manufacturers, distributors, and much more. Food on premises. Talk-in 146.265, 146.865 and 146.52 direct. For further info, contact Doug McArtin, WA2AUJ, 411 Bellevue Ave., Yonkers, NY 10703.

• **Nedrow, NY** — The Radio Amateurs of Greater Syracuse present their Syracuse Hamfest on October 8, 1977 from 9 a.m. to 5 p.m. at the Syracuse Auto Auction, Route 11, south of Syracuse. Food available all day, at reasonable prices. Large exhibitor area and flea mart under cover. For general info, contact Rags Hamfest, Box 88, Liverpool, NY 13088. Exhibitors info, contact Dale Mecomber, WB2FJO, Box 87, Skaneateles Falls, NY 13153.

• **Cedar Rapids, Iowa** — The Cedar Valley Radio Club annual hamfest will be held on Sunday, October 2, 1977. Top prizes are Atlas 210X xcvr, Wilson 1402 SM H/T, Heathkit HW-8 QRP CW xcvr, Clegg FM-76 xcvr, plus much more. Technical talks featuring Doug DeMaw, W1FB. Manufacturers and Dealers welcome. Talk-in on 146.16/.76, 146.52, 3.970, and 223.5 MHz. Advance tickets $1.50, $2.00 at the door. Write: CVARC Hamfest, Box 994, Cedar Rapids, Iowa 52406.

• **San Mateo, CA** — The Greater Bay Area and ARRL,Pacific Div. Convention will be a combined event this year held on Saturday and Sunday, Oct. 15th and 16th. The amateur radio fraternity of the Bay Area will turn out with their consistent strong support. The Hamfest Convention will be held at the Royal Coach Inn, centrally located on the San Francisco Peninsula just off the intersection of U.S. 101 and Route 92 in San Mateo. The hamfest is a club sponsored event, organized by a group of Amateur Radio clubs in the Greater Bay

(Continued)

Area. It is an excellent occasion for direct contact with the amateur market by dealers and manufacturers. For more info, contact the Greater Bay Area Hamfest, ARRL Pacific Div. Hamvention, Box 751, San Mateo, CA 94401.

• **Costa Mesa, CA** — The Government-Industry Data Exchange Program (GIDEP) will have its annual conference and workshop on Oct. 5-7, at the South Coast Plaza Hotel. For info, call or write Dennis Starling, Datagraphix, Inc., Box 82449, San Diego, CA 92138, (714) 291-9960, Ext. 1266.

• **Lima, OH** — The Northwest Ohio Amateur Radio Club Inc. will hold its annual hamfest on Oct. 9th, 1977 at the Allen County Fairgrounds. There will be table space available, manufacturer's displays, door prizes, trunk sales, and free camping space on Sat. night. Advanced tickets are $1.50 and $2.00 at the gate. Talk-in on 52/52. Lima rptrs. 146.07/67, 146.34/94, 222.16/223.76. Tickets and table reservations mail to: Noarc, P.O. Box 211, Lima, OH 45802, or call (419) 991-2711.

• **Rome, GA** — The Northwest Georgia ARC annual hamfest will be held at the Coosa Valley Fair Grounds on Oct. 9th. Gates open at 9:00 a.m. Talk-in 146.34/94. For more info, contact H.D. Dale, WB4AEG, Box 274, Adairsville, GA 30103.

• **Gaithersburg, MD** — The foundation for Amateur Radio will hold its annual hamfest on Sunday Oct. 23rd, 1977. Featured is a large flea market, food service, exhibits, ladies events, and many prizes. Main events are all indoors. Picnic grounds and free parking; will be held rain or shine. Participation fee is $2.00; sales space for flea market is $5.00 each on a first come basis; commercial exhibitors $10.00 each with pre-registration prior to Oct. 20th. Talk-in service provided. For more info, write or call Hugh Turnbull, W3ABC, 6903 Rhode Island Ave., College Park, MD 20740; telephone (301) 927-1797.

• **Wichita, KS** — The Wichita Amateur Radio Club, Inc. is hosting the Midwest ARRL Convention on Oct. 7th, 8th, and 9th, 1977 at the Broadview Hotel at 400 West Douglas, Wichita. The convention will start at 12:00 noon, Friday, and end 12:00 noon Sunday, October 9th. Times are in CST. We expect from 600 to 1,000 registrants at the convention. For further info, contact The Wichita Amateur Radio Club, Inc., 1520 West 16th St., Wichita, KS 67203.

Our Readers Say

Thank You Ten-Tec

Editor, CQ:

I would like to say thanks to Ten-Tec Inc., in particular their service technicians. Tom Lalvetti, WD4FVU also purchased an Argonaut 509 after reading your many articles on QRPp. The new radio developed a minor problem but was quickly repaired and returned to me by the service people at Ten-Tec Inc.

I praise this kind of service and will purchase their products in the future.

Gary Raus, WA2PUO

Plumbicon Corrections

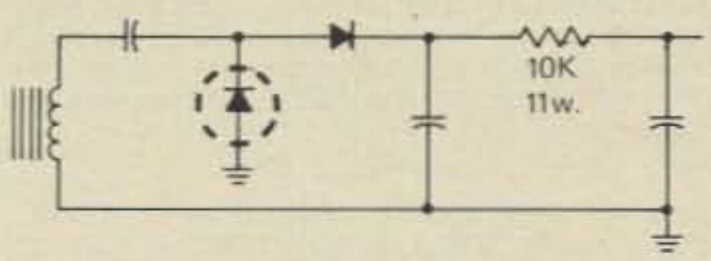
Editor, CQ:

It has come to my attention that three minor errors were published in my WB2DXC Plumbicon SSTV Camera article. They are as follows:

1) July 1977, page 31—The diagram shows 3, 10 megohm resistors at the bottom of the video circuit board. The one nearest the outer edge should be 10 k megohm. This resistor is so labeled on the circuit diagram.

2) July 1977, page 33—In the circuitry associated with ICg in the vertical deflection integrator, a 100 k variable resistor is shown feeding a 1 megohm resistor. This should be a 100 k megohm fixed, 1/2 w resistor with the 1 megohm resistor going to the top end. For correct connection, see horizontal deflection integrator. The vertical should be the same. The circuit board layouts and art work are correct and reflect the vertical deflection integrator as it should be.

3) July 1977, page 34, fig. 7—The 100 v zener diode is reversed (smoke)! The rectifier circuit in the +350 v supply is not correct. It should be as follows:



The circled diode is shown as a capacitor. This is a doubler circuit as shown. With the capacitor, output would be 175 v with a 115 v nominal secondary winding.

My original, reduced copies reflect the correct configurations which should be used with the exception of the 100 v zener diode polarity which is a mistake on my part. I am sorry that it occurred, however if that is the only error in such a large article, I consider myself very fortunate!

Jim McKeown, WB2DCX
Sidney, NY

Yea CQ!

Editor, CQ:

I'm sorry to say that I have been remiss in not writing to you any sooner.

First let me compliment you and your staff on the wonderful job you are all doing in publishing the best amateur radio publication.

Your columnists are direct and precise with their comments and information.

Your advertisers are prompt with any request that I have about their products.

Last, but not least, your Ham Shop is the greatest. Whatever I have advertised in the Ham Shop has been sold. I have had inquiries from many parts of the world about the items I had for sale.

I am also proud of my ham family. My wife is WA2JQC; my son is K2VGU; my daughter is K2ZCS; my son-in-law is K2KGF and my grandson is WA2HPS.

We all enjoy reading CQ Magazine. Keep up the good work.

Joseph Schwartz, K2VGV
Flushing, NY

This is the amplifier you have been waiting for

The new 2KD-5 linear amplifier...a one piece desk model with the power and reliability of a console

At Henry Radio, we know how to build only one kind of amplifier ... the best. We want you to compare the 2KD-5 with any other desk model at any price.

Remember, the 2KD-5 is only one model in the world's broadest line of amplifiers ... both vacuum tube and solid state ... for HF, VHF and UHF ... fixed station and mobile ... low power and high power.

Never before has any one company offered such a cornucopia of high power RF amplifiers.

Remember also that Henry Radio offers a broad line of commercial and FCC type accepted amplifiers covering the range of 3 MHz to 500 MHz. Henry amplifiers are in use all around the world. Commercial and export inquiries are invited.

- The 2KD-5 is a 2000 watt PEP input (1200 watt PEP nominal output) RF linear amplifier, covering the 80, 40, 20, 15 and 10 meter amateur bands.
- Two Eimac 3-500Z glass envelope triodes operating in a grounded grid circuit.
- Pi-L plate circuit with a rotary silver plated tank coil for greatest efficiency and maximum attenuation of unwanted harmonics.
- Full legal input in all modes. 2000 watts PEP input for SSB. 1000 watts DC input for CW, RTTY and AM.
- Jumper for 115 or 230 VAC, 3 wire single phase.
- 10.5" high x 15" wide x17.5" deep
- Price ...$895.00

2K-4...LINEAR AMPLIFIER. Offers engineering, construction and features second to none. Provides a long life of reliable service, while its heavy duty components allow it to loaf along even at full legal power. Operates on all amateur bands, 80 thru 10 meters. If you want to put that strong clear signal on the air that you've probably heard from other 2K users, now is the time. Move up to the 2K-4. Floor console...$995.00

TEMPO 6N2 brings the same high standards to the 6 and 2 meter bands. A pair of advanced design Eimac 8874 tubes provide 2,000 watts PEP input on SSB or 1,000 watts on FM or CW. Complete with self-contained solid state power supply, blower and RF relative power indicator. ...$895.00

TEMPO 2002. The same fine specs and features as the 6N2, but for 2 meter operation only. ...$745.00

TEMPO 2006. Like the 2002, but for 6 meter operation. ...$795.00

TEMPO VHF/UHF AMPLIFIERS. Solid state power amplifiers for use in most land mobile applications. Increases the range, clarity, reliability and speed of two-way communications. FCC type accepted also.

Model	Drive Power	Output Power	Price
LOW BAND VHF AMPLIFIERS (35 to 75 MHz)			
Tempo 100C30	30W	100W	$159.
Tempo 100C02	2W	100W	$179.
Tempo 100C10	10W	100W	$149.
HIGH BAND VHF AMPLIFIERS (135 to 175 MHz)			
Tempo 130A30	30W	130W	$189.
Tempo 130A10	10W	130W	$179.
Tempo 130A02	2W	130W	$199.
Tempo 80A30	30W	80W	$149.
Tempo 80A10	10W	80W	$139.
Tempo 80A02	2W	80W	$159.
Tempo 50A10	10W	50W	$ 99.
Tempo 50A02	2W	50W	$119.
Tempo 30A10	10W	30W	$ 69.
Tempo 30A02	2W	30W	$ 89.
UHF AMPLIFIERS (400 to 512 MHz)			
Tempo 70D30	30W	70W	$210.
Tempo 70D10	10W	70W	$240.
Tempo 70D02	2W	70W	$270.
Tempo 40D10	10W	40W	$145.
Tempo 40D02	2W	40W	$165.
Tempo 40D01	1W	40W	$185.
Tempo 25D02	2W	25W	$125.
Tempo 10D02	2W	10W	$ 85.
Tempo 10D01	1W	10W	$125.

TEMPO 100AL10 VHF LINEAR AMPLIFIER. Completely solid state, 144-148 MHz. Power output of 100 watts (nom.) with only 10 watts (nom.) in. Reliable and compact ...$199.00

TEMPO 100AL10/B BASE AMPLIFIER ...$349.00

Tempo solid state amplifiers are available at Tempo dealers throughout the U.S.

please call or write for complete information.

Henry Radio

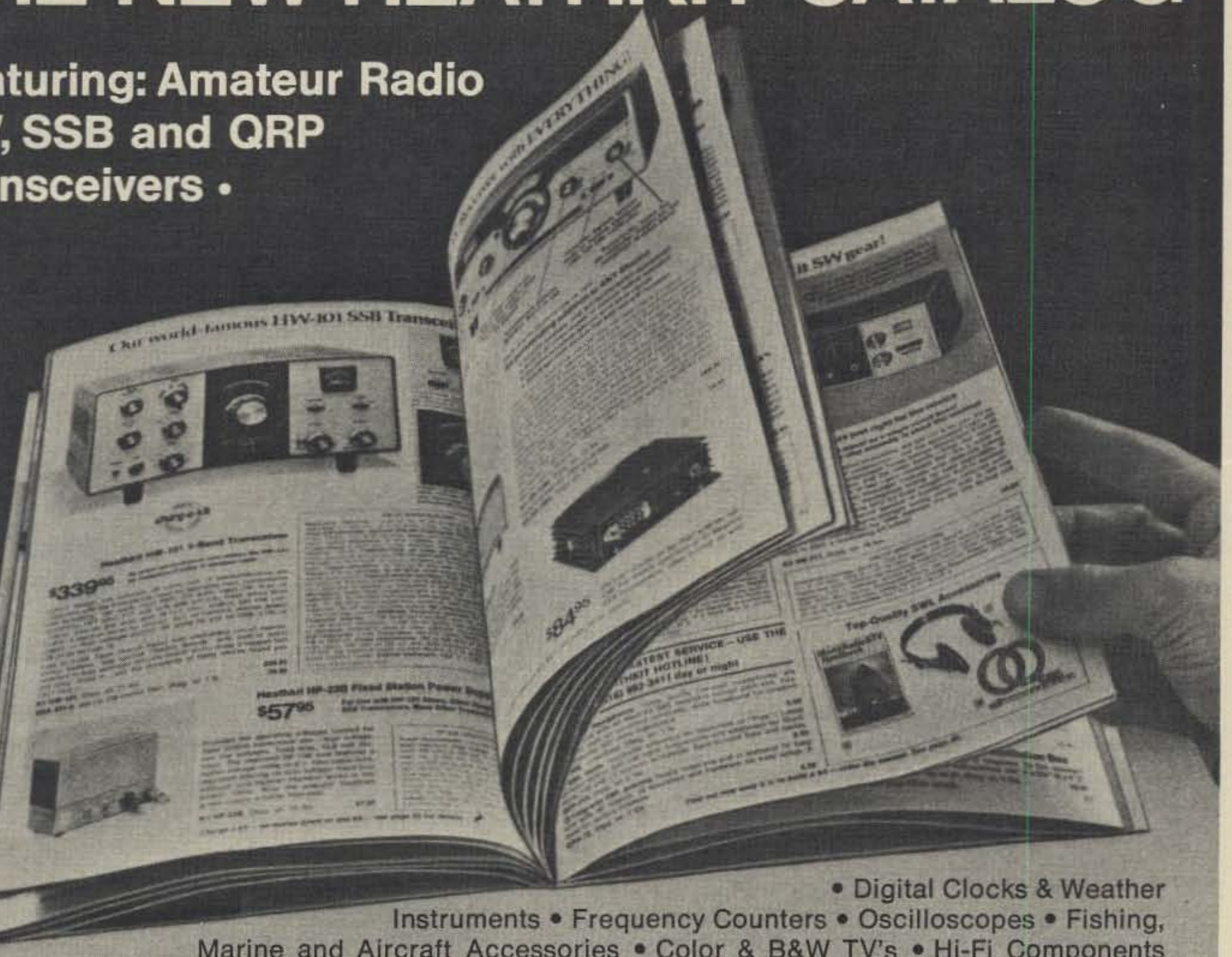
11240 W. Olympic Blvd., Los Angeles, Calif. 90064 213/477-6701
931 N. Euclid, Anaheim, Calif. 92801 714/772-9200
Butler, Missouri 64730 816/679-3127

Prices subject to change without notice.

FREE

THE NEW HEATHKIT CATALOG

Featuring: Amateur Radio CW, SSB and QRP Transceivers •



• Digital Clocks & Weather Instruments • Frequency Counters • Oscilloscopes • Fishing, Marine and Aircraft Accessories • Color & B&W TV's • Hi-Fi Components PLUS a new learn-at-home Amateur Radio Novice License Course that's GUARANTEED* to help you get your Novice ticket.

*If you fail to pass your FCC Novice exam after completing this course, we'll REFUND the money for the course material.

AND SPECTACULAR VALUES IN FULLY ASSEMBLED 40-CHANNEL CB!

Thousands of people have discovered the fun — and savings — of handcrafting a fine piece of electronic equipment. You can build it better — let us show you how.

Send for your FREE catalog today!

Heath Company, Dept. 012-340
Benton Harbor, Michigan 49022

HEATH
Schlumberger

Heath Company, Dept. 012-340
Benton Harbor, Michigan 49022

Please send me my FREE Heathkit Catalog.
I am not on your mailing list.

Name_____

Address_____

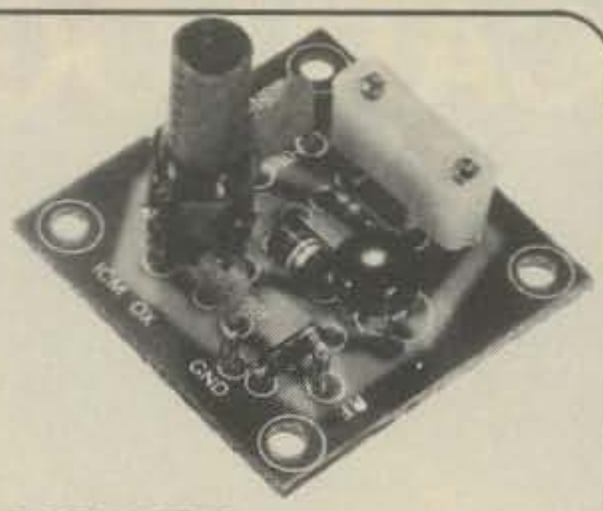
City_____ State_____

CL-634 Zip_____

for the experimenter!

INTERNATIONAL CRYSTALS & KITS

OSCILLATORS • RF MIXER • RF AMPLIFIER • POWER AMPLIFIER



OX OSCILLATOR
Crystal controlled transistor type. 3 to 20 MHz, OX-Lo, Cat. No. 035100. 20 to 60 MHz, OX-Hi, Cat. No. 035101
Specify when ordering.

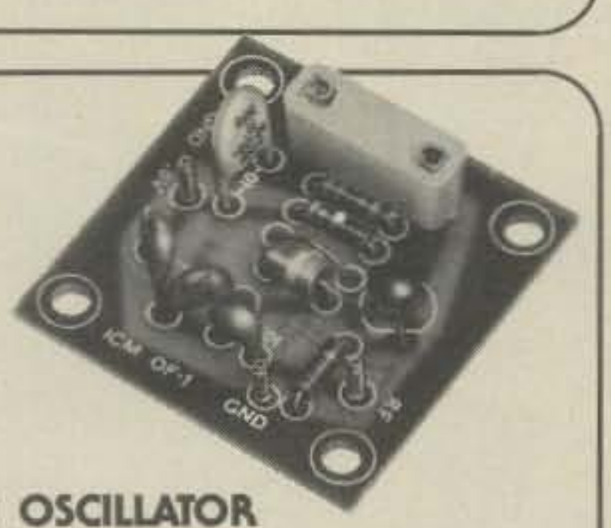
$3.95 ea.

MXX-1 TRANSISTOR RF MIXER
A single tuned circuit intended for signal conversion in the 30 to 170 MHz range. Harmonics of the OX or OF-1 oscillator are used for injection in the 60 to 179 MHz range. 3 to 20 MHz, Lo Kit, Cat. No. 035105. 20 to 170 MHz, Hi Kit, Cat. No. 035106
Specify when ordering.

$4.50 ea.

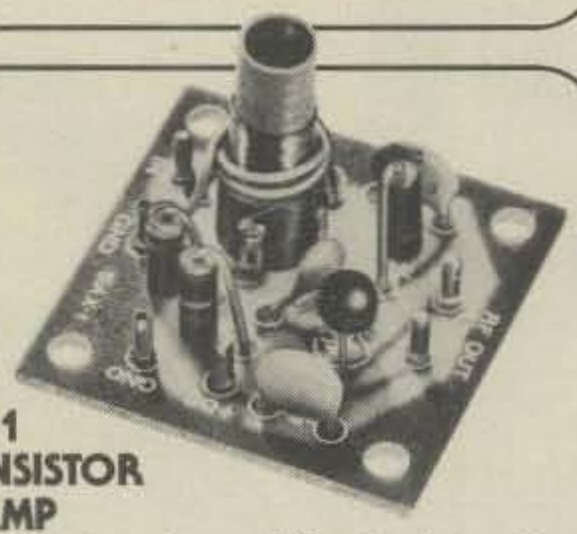
PAX-1 TRANSISTOR RF POWER AMP
A single tuned output amplifier designed to follow the OX or OF-1 oscillator. Outputs up to 200 mw, depending on frequency and voltage. Amplifier can be amplitude modulated. 3 to 30 MHz, Cat. No. 035104
Specify when ordering.

$4.75 ea.



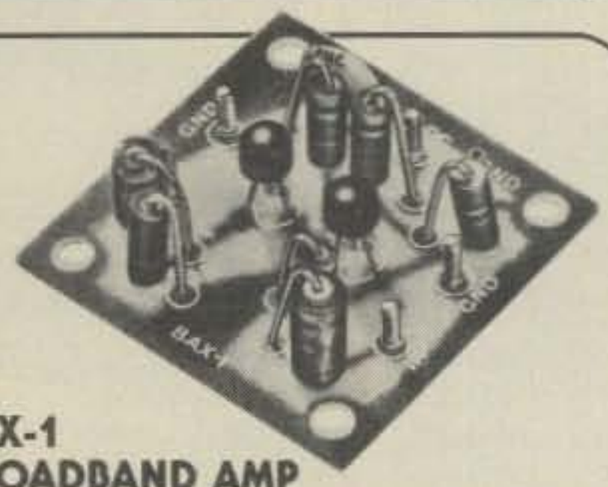
OF-1 OSCILLATOR
Resistor/capacitor circuit provides osc over a range of freq with the desired crystal. 2 to 22 MHz, OF-1 LO, Cat. No. 035108. 18 to 60 MHz, OF-1 HI, Cat. No. 035109
Specify when ordering.

$3.25 ea.



SAX-1 TRANSISTOR RF AMP
A small signal amplifier to drive the MXX-1 Mixer. Single tuned input and link output. 3 to 20 MHz, Lo Kit, Cat. No. 035102. 20 to 170 MHz, Hi Kit, Cat. No. 035103.
Specify when ordering.

$4.50 ea.



BAX-1 BROADBAND AMP
General purpose amplifier which may be used as a tuned or untuned unit in RF and audio applications. 20 Hz to 150 MHz with 6 to 30 db gain. Cat No. 035107
Specify when ordering

$4.75 ea.

.02% Calibration Tolerance
EXPERIMENTER CRYSTALS
(HC 6/U Holder)

Cat. No.	Specifications	
031080	3 to 20 MHz — for use in OX OSC Lo *Specify when ordering*	$4.95 ea.
031081	20 to 60 MHz — For use in OX OSC Hi *Specify when ordering*	$4.95 ea.
031300	3 to 20 MHz — For use in OF-1L OSC *Specify when ordering*	$4.25 ea.
031310	20 to 60 MHz — For use in OF-1H OSC *Specify when ordering.*	$4.25 ea.

Shipping and postage (inside U.S., Canada and Mexico only) will be prepaid by International. Prices quoted for U.S., Canada and Mexico orders only. Orders for shipment to other countries will be quoted on request. Address orders to:
M/S Dept., P.O. Box 32497,
Oklahoma City, Oklahoma 73132.

ICM

International Crystal Mfg. Co., Inc.
10 North Lee
Oklahoma City, Oklahoma 73102

A Message From The Publisher

The following letter, sent to the advertising manager of *QST,* was duplicated and forwarded to several other publishers serving the amateur radio market. I feel that readers of *CQ* might find it of interest.

Yaesu Electronics Corporation
15954 Downey Avenue
P.O. Box 498
Paramount, California 90723

June 14, 1977

Mr. Lee Aurick
QST
225 Main Street
Newington, CT 06111

Dear Lee,

As we explained over the telephone today, an insertion order has been mailed to you for the first Yaesu four color ad which is set for your September issue. The materials will come to you this week from Thomas Advertising in Torrance, as usual.

This has been a bitter experience for us, and while you can, and have forced us to spend a lot of money for no good purpose, we want to let you know just how deeply we resent such high handed and unfair treatment, especially to change the terms of contract in midstream.

After receiving your pronouncement that all ads had to be in four color and would be charged at that rate even if black and white, there simply was not time to put together anything for the August issue. (You have received our insertion order for a black and white ad for August).

Charging us color rates for a black and white is absolutely, totally, unfair, and we plan to let people know about it.

The extra cost for color, plus all of the expense that we must go to in ad preparation, simply is not justified in view of the small amateur market. Even if it grew at 30,000 per year, that growth would be of no significance dollar-wise when divided up between companies like ours, the ma and pa operations, and second hand equipment buyers. In amateur products, color doesn't buy you anything, Lee. Our products are black or grey and color does nothing for them.

After an expensive exercise in TWX coordination, we finally got a color ad together, complete with separations, etc, etc for September, but it's not totally satisfactory in our view, even now. Never the less, we'll have to go with it as is.

We will try to have another ad ready for you by July 15th for October, however, the color work is done in Japan, which can slow things down. This is all 150 line screen and we are glad to know that your printer can guarantee good reproduction.

You caused us great concern when you told us QST wanted 130 line screen after we had it done to the industry standard of 150 lines.

This unilateral action by QST has destroyed our advertising budget, Lee, and we are pretty sore about it.

We will have to raise some prices now, and by golly we intend to let the public know why!

And if QST insists on this destructive course, we want to know now. while we are getting our 1976 budget ready. We run ads in other magazines too, and not one has ever been so unilateral or uncooperative.

Sincerely,

Bernard E. Tower, W6RNW
General Manager

I don't believe that this particular correspondence requires any further comments on our part. However, I do feel, that as long as another member of the industry has raised the issue of *QST*'s business practices and how they affect the prices of equipment used by us amateurs, that maybe it's high time to let the amateur public know more about the workings of the ARRL *(QST)*; especially so, because most amateurs are kept in the dark on this subject.

Many years ago a visitor from an amateur equipment manufacturer walked into my office and dropped on my desk a photostated copy of a series of letters between a then ARRL director and a former director. I read those letters with great interest, realizing that if the material contained therein were ever exposed to the mass amateur population it might set the ARRL back twenty years because of the scandal it might evoke. The letters detailed many inside conversations that took place at league meetings; included were many 'off the record' conversations between league officials that, needless to say, would prove very embarrassing to the organization.

After reading this material I asked my visitor why he was offering it to *CQ.* His answer was that he felt we should publish it. By so doing, he felt, we could seriously weaken, if not totally cripple, the ARRL's position in amateur radio. I told him pointedly that neither *CQ* nor I personally had any desire to weaken or cripple the league. To do so would be to weaken amateur radio in the eyes of the public, the government, and the overseas amateur population. Those documents which incidentally later got to be called "Doyle's Diary" after one of the correspondents involved, is still in my files. Over the years a few angry anti league editors attempted to get it widespread exposure but with little success.

Which brings up a point I wish to reemphasize. I don't now, or ever have in the past, wish to cripple or weaken the league. I do feel, however, that the league has done many things to hamper the progress of amateur radio, as well as having taken credit for many progressive programs for which they deserve little or no actual credit. The Oscar program is a good example. This dynamic movement was launched originally with no league support, no league publicity, and no league encouragement. After it became a reality the league magnanimously agreed to take it over. One more case of the ARRL being able to say to amateurs, "look what your league has done for you".

Now, the league has done many fine things for amateur radio. And they've never let the amateurs forget it. But it's high time the league moved into the space age and stopped worshipping Hiram Percy Maxim. It's high time the league offered more than just lip service to amateurs needing legal assistance in tower, antenna and TVI suits. If the league were doing a thorough job there'd be no need for organizations such as the Personal Communications Foundation. There'd be no reason for outstanding amateurs to withdraw from

the ARRL Foundation. There wouldn't be the lack of awareness at the public level as to what amateur radio's all about. And believe me guys, your typical American citizen has very little knowledge of what our hobby is all about. To him, CB and Amateur Radio are one and the same. Because he hasn't been made aware.

I think it's time for the amateur population, especially ARRL members, to be shown what the league is all about structurally. In dollars and sense, not just W1AW and ARRL conventions. For that reason I'm going to bring the sacred cow out of the barn and publish the league's financial report to its directors covering the past two years. That report follows below:

Unfortunately, what the statement doesn't show is that the ARRL's predominant interest is publishing. Somewhere between 80% and 90% of all ARRL's activities have to do with publishing magazines, books, pamphlets and membership supplies. All of which you amateurs pay for.

Now there's nothing wrong with being in the publishing business. I've made a livelihood out of publishing for more than 22 years. It's a hectic business, very rewarding in many ways, and very exciting. It's hard to get filthy rich in magazine publishing, but not too hard to knock out a comfortable living. But a publisher shouldn't be ashamed to admit to the world at large that he is a publisher.

What we have here is a publishing company operating under the facade of a non-profit membership organization. Now, don't get me wrong. I know that ARRL's members elect the directors, and the directors appoint the league staff. It's all very democratic. But the league enjoys some very handsome benefits from its non-profit status that other publishers in the field don't enjoy. Things like preferred postal rates, tax-exempt ad revenue, free editorial material, to name a few. The league has tens of thousands of members who solicit new members with the assumption that they're strengthening amateur radio. What these members are doing is selling subscriptions to *QST*, and they're not getting a dime back in commissions.

Take a look at the salaries on the league report. Add to them the pensions and other benefits like insurance. A lot of people are making a nice living in Newington working at Hq. And then calculate how many out-of-pocket dollars are spent on programs that truly benefit amateur radio as a service and members specifically, and you find it's a small piece of the total pie.

I look at the $90,000 plus figure for 'general expenses' and I say to myself that's a pretty big number to go unitemized. I look at $42,000 plus for legal and professional fees and I tell myself someone's got a nice cushy contract. I compare other expenses for the routines of running a publishing company with my own company's expenses (our company's total volume last year was within three percent of the league's in total sales) and I tell myself that someone's overpaying for lots of services somewhere.

Instead of saving money by careful management the ARRL's solution to their money problems is to raise prices. The advertising page rates were just increased by at least 50% and more in some areas. The membership rates have jumped drastically in recent years, far out of proportion to the rest of the industry.

All of which brings me back to the letter that inspired this whole subject in the first place. Mr. Tower's remarks make a lot of sense. Better money management instead of massive price increases would mean lower costs for amateur equipment to us amateurs. You guys are paying through the nose because ARRL headquarters is run by amateurs who have acted like amateurs for years, and gotten by. The next time you go to buy a new station and stagger at the high costs, sit back and think. Look what your league has done for to you.

DIRECTORS' LETTER

of

The American Radio Relay League, Inc.

Administrative Headquarters, Newington CT 06111

No. 1679 April 22, 1977

ALL DIRECTORS:

Attached are the audited statements of revenue and expense for 1976, with comparative figures for 1975.

- . . -

We are syndicating a six-part series of public service type radio shows about amateur radio. Each of the 15-minute shows ties the wide world of amateur radio into the daily routines of the community; therefore, they constitute public service programing, which will be helpful in getting air time. The shows are the brain child of Steve Mendelsohn, WA2DHF. If you can't get air time for the shows, please contact Pete O'Dell, Public Information Officer, Hq. See the article in May QST.

- . . -

Nominations are still being sought for the vhf/uhf advisory committee (VUAC). The sixth district has submitted 12 nominations, followed by the eighth district with 11 (all nominating the same person). No nominations have been received from the ninth, tenth or Canadian areas. Nominations should be sent to VUAC Hq. Liaison Jim Kearman, WIXE.

Sincerely yours,

Richard L. Baldwin, W1RU
General Manager

RLB:dlf
(A)
Attachment

THE AMERICAN RADIO RELAY LEAGUE, INC.

PRELIMINARY STATEMENT OF REVENUES AND EXPENSES FOR 1976

WITH COMPARATIVE FIGURES FOR 1975

	1976	1975
REVENUES		
Publications:		
Advertising Sales, QST	$ 551,060.72	$ 443,430.91
Advertising Sales, Booklets	15,457.50	5,581.75
Retail Sales, QST	64,372.17	44,257.44
Handbook Sales	646,263.45	411,237.97
Booklet Sales	669,253.59	445,584.30
Tune in the World Sales	196,583.00	------
Tune in the World Advertising Sales	14,422.50	------
Total	$2,157,412.93	$1,350,092.37
Membership dues:	1,161,292.12	1,058,086.91
Membership supplies sales	125,112.04	83,495.32
Interest and dividend income	35,171.05	29,156.73
Increase in cash surrender value of Life insurance	2,421.67	2,433.02
Cash discounts earned	1,344.59	376.33
Commemorative stamps	46.00	29.00
Contributions	1,419.22	429.37
Awards income	21,824.46	5,894.65
Gain (loss) on sale of securities and plant assets	37.87	(4,892.95)
WARC income	1,203.64	------
Overseas QSL Bureau income	2,096.26	------
Gross Revenues	$3,509,381.85	$2,525,100.75
Deduct:		
Exchange & collection charges	1,895.58	1,470.15
Cash discounts allowed	1.92	10.67
Total	1,897.50	1,480.82
Net Revenues	$3,507,484.35	$2,523,619.93

OPERATING STATEMENT, continued

	1976	1975
EXPENSES:		
Publications:		
QST Magazine	683,110.91	655,939.48
Handbook	169,664.34	97,184.67
Booklets	154,495.49	117,712.88
Tune in the World Production Costs	72,040.13	------
	1,079,310.87	870,837.03
Salaries	936,933.06	660,416.94
Pay roll taxes	38,748.23	24,583.89
Unemployment Comp. Exp.	5,660.50	3,259.00
Membership supplies exp.	50,933.95	54,654.80
Electronic Data Processing	53,042.07	45,247.65
QST Member forwarding exp.	137,386.33	82,001.25
QST retail sales fwdg. exp.	6,653.07	2,069.85
Other publications fwdg. exp.	151,703.62	86,535.00
Telephone and Telegraph	42,722.43	20,737.10
Postage	133,289.17	65,498.29
Office supplies and expenses	60,243.01	39,853.69
Legal & professional expenses	42,375.50	47,955.48
Stationery, printing & forms	163,564.75	59,870.25
Building maintenance & exp.	26,600.58	18,340.50
General expenses	90,490.33	38,120.50
Insurance expenses	11,234.51	6,981.89
Interest expense	1,723.49	2,080.52
Employees pension & Ins. exp.	112,161.56	56,733.16
Light, heat and water	18,470.48	14,760.54
Headquarters station expense	1,759.85	3,840.99
Comm. Dept. field expense	5,981.07	5,127.35
Business traveling expenses	44,759.76	15,625.88
Contact traveling expenses	32,871.91	26,350.32
Promotion travel expense	3,523.43	------
Automobile expenses	1,900.06	620.37
Laboratory expenses	7,150.23	6,756.48
Bad debts provision	15,026.35	3,597.69
Connecticut sales and use tax	3,258.52	227.12
Property taxes	22,998.91	21,256.10
Payroll processing expense	1,353.04	1,142.06
Awards expense	8,539.12	3,137.59
WARC expense	51,217.18	------
Overseas QSL expense	1,821.43	------
Provision for depreciation	36,083.01	28,121.67
Total Expenses	$3,401,491.38	$2,316,340.95

OPERATING STATEMENT, concluded

	1976	1975
First Gain (Loss) from Operations for Year	$ 105,992.97	$ 207,278.98
Administrative expense of directors	53,822.51	47,897.54
Board meeting expenses	38,397.26	19,579.78
Board Committee expenses:		
Executive Committee	5,867.89	4,706.20
International Affairs Committee	412.07	711.13
Legal & Regulatory Committee	905.81	564.68
Membership Affairs Committee	1,153.40	533.01
Management & Finance Committee	2,449.36	984.03
Plans & Programs Committee	1,505.59	1,019.70
Other committees	3,504.13	4,161.18
President's expense	6,247.27	------
Opinion survey expense	------	17,160.75
Travel expenses:		
SCM and QSL Managers	16,580.78	12,455.89
Section Emergency Coordinators	4,976.16	6,255.17
National Traffic System	2,885.22	4,229.03
	138,707.45	120,258.19
Net Gain (Loss) from operations for the Year	(32,714.48)	87,020.79

The Impact of Television in 1928 and the story of the Two-Tube Television Receiver That Was the Grandfather of the Famous National SW-3

The Receiver That Started It All—The SW-2

BY WILLIAM I. ORR*, W6SAI

Pictures by radio!
Television!
Long Distance Television!
Reception up to 1000 Miles!

Amazing as it may seem today, there was a television "boom" in 1928, fully ten years before television receivers became generally available to the public. And one result of this short-lived craze was the development of an obscure, two-tube receiver that set the course for future radio development that has guided the technical destiny of amateur radio to the present time. This is the story of that receiver, the obscure and little-known *National SW-2*.

*48 Campbell Lane, Menlo Park, CA 94025.

Early Television

During the winter of 1927-28, the General Electric Company, and others, started experimental television broadcasts on various frequencies in the broadcast band and shortwave spectrum. The television picture was mechanically produced and the

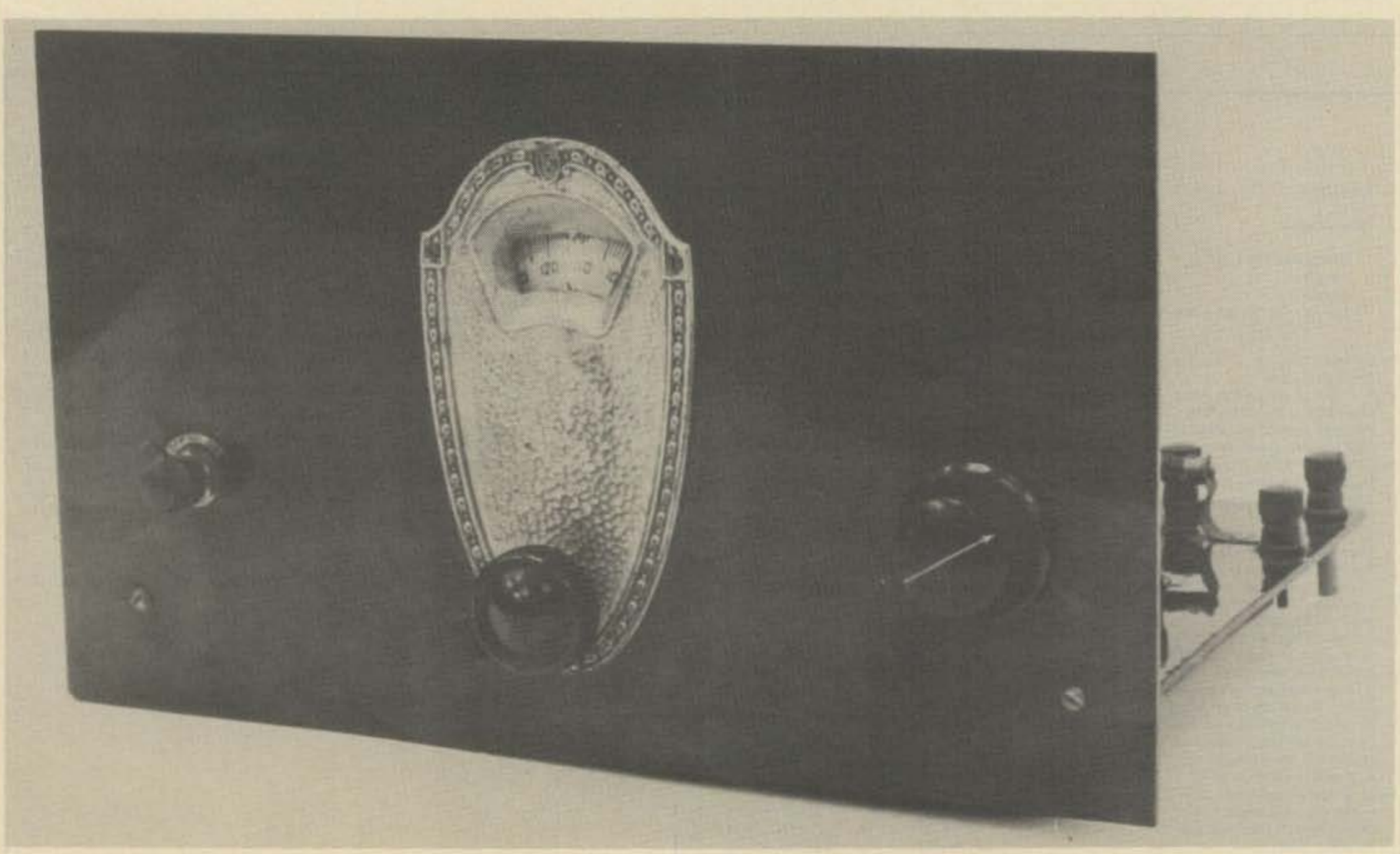


Fig. 1—The two tube National SW-2 receiver, the "Godfather" of the famous SW-3. This simple regenerative receiver was primarily designed for high frequency television reception which enjoyed a vogue in the 1928-1930 era. The receiver was battery operated and had an untuned r.f. stage followed by a regenerative detector. To the left of the main dial is the filament switch and to the right is the regeneration control.

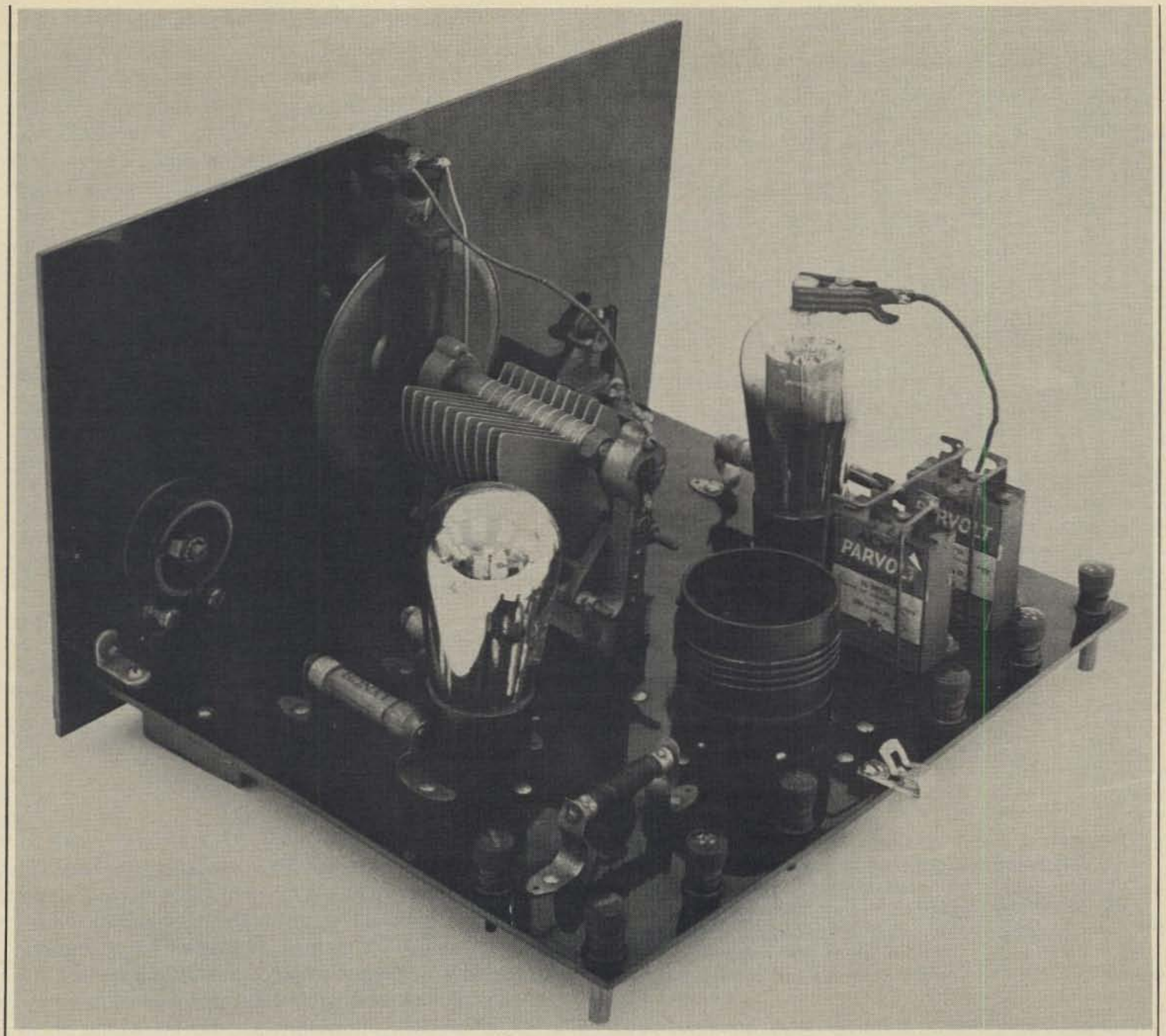


Fig. 2—The National SW-2 receiver was built upon a bakelite (phenolic) chassis bolted to a bakelite panel. A special wide-spaced tuning condenser was used. The plug-in coil is seen directly in line with the condenser. At the far corner of the chassis is the UX-222 tetrode r.f. amplifier tube, with the UX-112A detector tube in the foreground.

signal consisted of 24 lines sent at the rate of 20 frames per second. The picture passband was about 10 kHz.

The General Electric station in Schenectady, N.Y. (WGY) transmitted pictures on 790 kHz and 13,660 kHz for about a half-hour on Tuesday, Thursday and Friday. And in Washington, D.C. The Jenkins Laboratories transmitted television pictures on 6240 kHz using the call 3XK. The pictures were at a rate of 15 frames per second and 48 lines per picture. Transmissions consisted of silhouettes and half-tones. Neither station transmitted sound while the picture was being televised.

Who Watched These Early Broadcasts?

That's a good question. Since no television receivers were being sold in 1928, the eager viewer either had to build his receiver from scratch, or else buy one of the available kits that made up a crude, revolving-disc television receiver that displayed flickering images that took a wizard to interpret. However, with a half-dozen or so stations transmitting pictures in the east and mid-west, and with picture reception possible up to several hundred miles, the thought of snatching a picture out of the air bemused enough amateurs and listeners to keep the fad going for at least a year.

During this time, the National Company of Malden, Massachusetts was building components for the famous Browning-Drake broadcast receiver kit and struggling to get into the booming shortwave hobby. The previous business of the company had

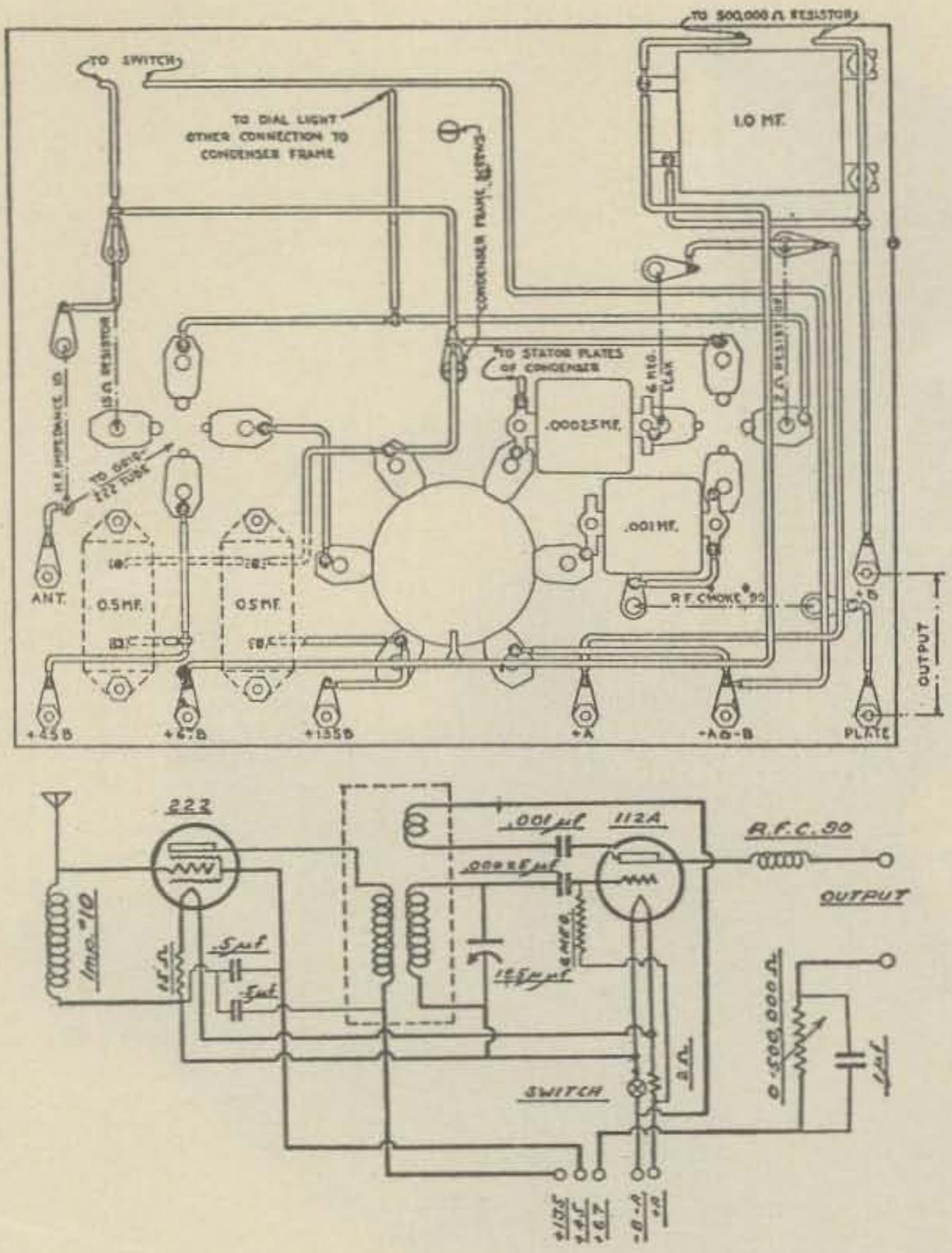


Fig. 3—The layout and schematic of the National SW-2. Note the shunt feed arrangement in the plate circuit of the UX-112A detector tube. This receiver established the "world's record" for long distance high frequency television reception. An auxiliary five stage video amplifier followed the receiver to provide sufficient signal level to drive the "glow-tube" used in the rotating disc TV converter.

largely been in metal forming (toys, shovels, cooking utensils and hardware) and one of the first purely radio efforts undertaken was to build a receiver kit for shortwave reception in general, and television reception in particular. Thus was born the SW-2 receiver, the ancestor of today's modern shortwave receiver.

The SW-2 Receiver

In early 1928 few commercial shortwave receivers were available for the shortwave enthusiast and radio amateur. The greater percentage of such receivers were homemade. However, the R.C.A. Van Cortland Park Laboratory did make a 4-tube shortwave receiver design that was to be manufactured by Westinghouse for export to Brazil and Argentina. Negotiations between the National Company and R.C.A. soon led to a low priced National kit, largely copied from the R.C.A. prototype receiver, less the two stage audio amplifier. This receiver kit was first called the "SG" (for screen grid), but was also known as the SW-2 (for short wave, two tubes).

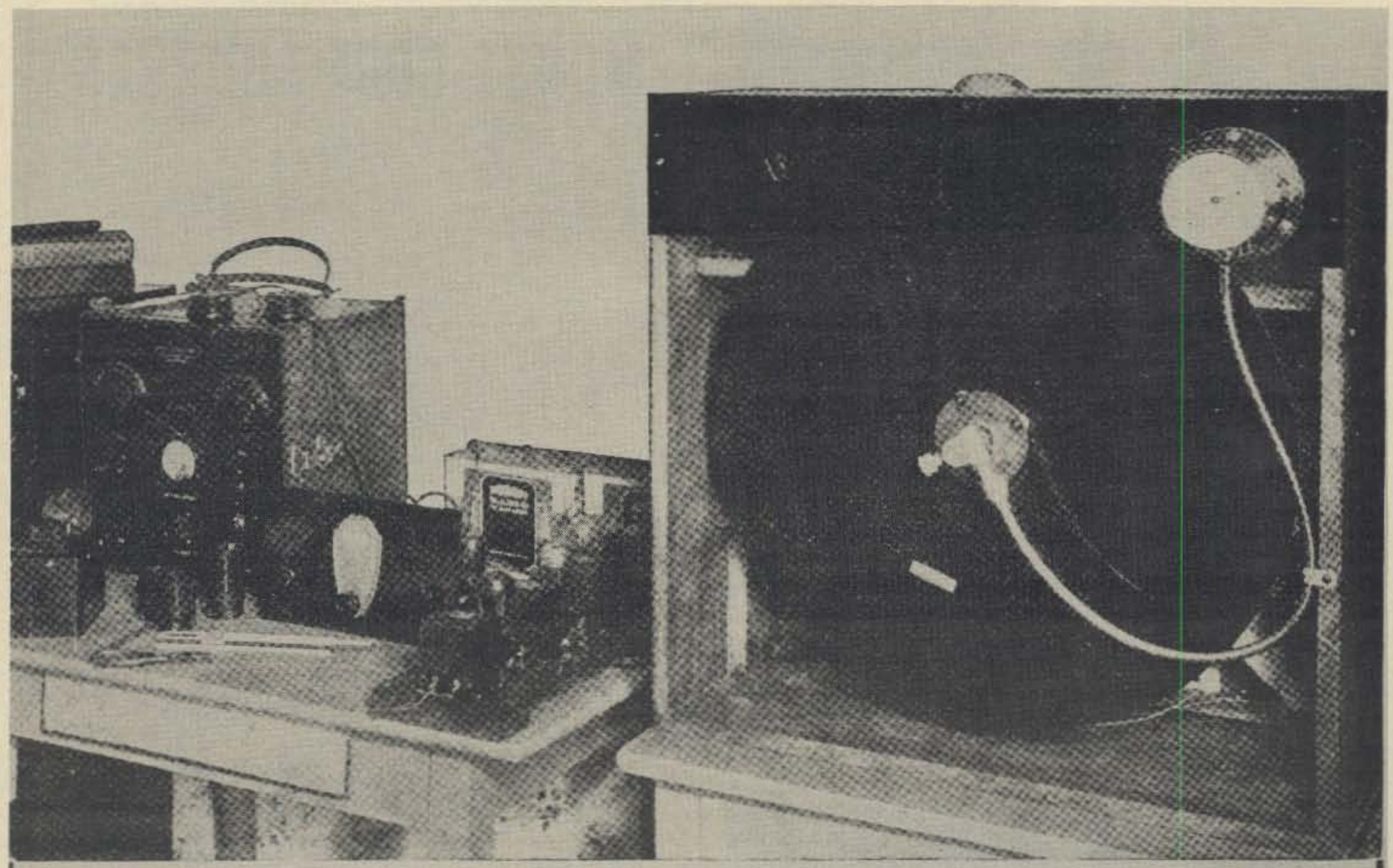
The receiver was simplicity itself (fig. 1). It was built upon a bakelite (phenolic) chassis and panel and consisted of an untuned r.f. amplifier stage and a regenerative detector. Tuning was accomplished by a large, vernier dial centered on the panel. The major components (and there weren't many of them) were bolted or riveted to the bakelite chassis and a large plug-in coil was mounted into a clever socket drilled in the chassis.

According to an article in *Radio World* magazine of September 8, 1928 the National Screen Grid circuit had "unique features which set it apart from all other shortwave receivers". The unique features, it seems, comprised a system of controlled regeneration that would allow the shortwave signal to be tuned in without interlocking effects between tuning and regeneration. This was accomplished with the use of a fixed feedback coil and coupling capacitor, while the regeneration was controlled by varying the plate voltage on the detector tube. As *Radio World* put it, the receiver is "as easy to tune as to open a door with a single knob to turn".

The Circuit of the SW-2

The circuit of this primitive receiver is shown in fig. 3. A UX-222 "screen grid" tube was used as an untuned r.f. amplifier stage. Providing a modest degree of amplification, the r.f. stage isolated the detector from the antenna and provided improved signal stability when the antenna was moved about in a strong wind. Yes, with the old regenerative receivers, frequency stability was affected by the movement of the antenna wire in the wind! Today, the untuned r.f. stage would be worse than useless, as it provides no protection to the detector from off-frequency signals and is very susceptible to overloading and cross-modulation. But it served the purpose for which it was intended in those dear, dead days and was an effective isolation device between antenna and detector.

The r.f. stage was followed by a UX-112A regenerative detector. The 112A was a high transconductance version of the 201A tube, greatly favored by the connoisseurs of receiver design in the "thirties". The improvement over the 201A however, viewed from these days, is highly debatable. In any event, the National Company used the newer tube and the circuit must have been effective, as the SW-2 was acclaimed to be the "holder of the world's record for distance reception of televised



The National Screen Grid Short-Wave Receiver, National Amplifier and National Radial Aperture Scanning Disc, with which *James Millen* of Station 1AXL, Malden, Mass., has been receiving experimental television images from 3XK at Washington, D. C. National Transmitting Condensers and Precision Vernier Dials are also being used by the pioneer television transmitting stations *3XK....WRNY....WLEX* and others now under construction.

Write Today for Short-Wave Bulletin 128Q.

NATIONAL. CO. INC. W. A. READY. PRES. SHERMAN. ABBOTT &. JACKSON. STS. MALDEN. MASS

Fig. 4—A National Company advertisement in QST showed the SW-2 receiver, the video amplifier and the "flying disc" television viewer. This provided a picture slightly larger than a postage stamp. Most receivers incorporated a magnifying glass to bring the picture up to reasonable size. Picture synchronization was achieved by controlling the speed of the "flying disc".

movies".

The r.f. stage is interesting in that the UX-222 tube has a 3.3 volt filament that is run from the 6 volt filament supply. A 15 ohm "equalizer" (dropping resistor) in one filament leg supplies the correct voltage to the tube and at the same time provides 2.7 volts of bias for the grid circuit. The detector circuit is more or less conventional, in spite of the "unique features" claimed in the descriptive article, and the whole receiver is a good example of the state of the art in mid-1928.

How Good Was TV Reception in 1928?

A press release by the General Electric Co. stated that transmission of television signals on short-waves "permitted reception at a great distance, unhampered and undisturbed by static". The statement went on to say, "The demonstrations mark another step in the progress toward television for everyone. Much remains to be done, but the first appearance of television pick-up outside of the laboratory is a forerunner of the day when such apparatus will be as familiar as the present microphone, and it may sometime be expected to find its place at all great public functions, at athletic events, etc., carrying not a verbal description of the event, but an actual picture. Reports of reception of images have been received from Los Angeles, Detroit and several places in Pennsylvania".

Notwithstanding the press release, reception of early TV was a sometime thing. The January, 1929 issue of *QST* reported, in an article by "The Old Man", that after twiddling, jiggling and tweaking the dials of a television receiver, a picture was finally discerned by the time the program was about over. The Old Man said, "For about a half a second, actually, I had the picture. It was a rotten picture. It flickered and it was fuzzy and foggy, and about the time I was wondering how and why they picked on a cow to televise, it suddenly dawned on me that it was a man's face I was looking at. Then I lost synchronism and my man disappeared in a maze of

badly intoxicated lines. By the time the broadcast had finished, I had a brand new and extensive vocabulary". So much for the early TV!

By mid-1930 the television boom had collapsed, and TV was relegated to the laboratory once again. Shortwave transmission of television had proven to be impractical, and the 24 line picture was of little interest to the viewer. It would be another decade before television again showed its face to the public.

The Demise of the SW-2 Receiver

The quick rise and rapid collapse of shortwave television prevented the SW-2 receiver from being a big seller. Advertised only once in *QST*, fast-moving events overtook the primitive design and the receiver ceased production after an estimated fifty sets had been built and sold. A four tube version having two extra audio stages (the SW-4) sold in slightly greater numbers but it, too, was soon to be eclipsed. The public seemed tired of receiver kits and wanted a completely assembled, ready-to-play receiver. But the production of the SW-2 receiver had whetted the appetite of the National Company, and it now saw its future in shortwave radio, not in the highly competitive field of broadcast radio.

One basic fault of the SW-2 receiver was that—despite the "unique" regeneration control system—the tuning of the receiver was highly erratic, varying from day to day and week to week. A station never came in on the same point on the dial two days in a row! After a great deal of experimentation, it was discovered that the plug-in coil form was highly hygroscopic, and absorbed water from the atmosphere on damp days. On warmer days, the water was evaporated out of the form, thus varying both the Q and the inductance of the coil in a very irregular fashion! The culprit was found to be the wood filler used in the preparation of the coil material. A switch to mica filler solved the problem and paved the way for today's highly efficient coils and inductors.

(*The author is fortunate enough to own a National SW-2 and has conjectured that baking the coils in the oven to drive out the moisture and then giving them a thin coat of* Krylon *spray would quickly solve the problem today!*).

Lessons Learned From the SW-2

Even though the sales life of the SW-2 could be counted in months, it left a lasting impression upon radio design. The untuned r.f. stage was found to have insufficient selectivity, even by 1928 standards. The problem of cross-talk and intermodulation existed in strong signal areas. The bakelite chassis-

(Continued on page 96)

The ATLAS 210x/215x fits them all!

ECONOMICAL ■ POWERFUL ■ RELIABLE COMMUNICATIONS FOR MOBILE ■ PORTABLE OR MARITIME MOBILE.

The Atlas transceiver is by far the most popular single sideband amateur SSB transceiver for mobile and maritime service. With its low power consumption, small size: 3½" x 9½" x 9½", and light weight: 7 pounds, it fits into any automobile, boat, or even an attache case.

Despite its compact design it packs a hefty 200 watts of power providing inexpensive world wide communications on 5 amateur bands.

And with the exclusive Atlas Mobile Mounting Kit, the 210x/215x can easily be transferred from boat to car in seconds. Simply slip it out of one mounting kit into the other, and connections for the antenna jack, mic jack and AC or DC input are made automatically.

The Atlas 210x/215x is a powerful, reliable, yet lightweight amateur radio that fits almost anything that moves, and is available at most amateur radio stores.

Atlas 210x or 215x ..... **$679.**

Model 210x covers 3.5, 7, 14, 21 and 28 MHz ham bands. Model 215x covers 1.8, 3.5, 7, 14, and 21 MHz ham bands.

Plug-in Mobile Kit ..... **$ 48.**

For complete information see your Atlas dealer, or drop us a card and we'll mail you a brochure with dealer list.

NOW! ***AN EXCITING NEW ADVENTURE NOVEL ABOUT HAM RADIO!***

"The French Atlantic Affair"

by Ernest Lehman K6DXK.

The Atlas 210x is the seven pound superstar of this suspense thriller, published by Atheneum. The "French Atlantic Affair" dramatizes amateur radio as only a ham could write it.

Get it at your local bookstore or from the Ham Radio Communications Bookstore, Greenville, New Hampshire 03048.

ATLAS RADIO INC.

417 Via Del Monte, Oceanside, CA 92054
Phone (714) 433-1983
Special Customer Service Direct Line
(714) 433-9591.

THESE TWO WORDS SHOULD ALWAYS BE USED TOGETHER:

Wilson ... and 2-Meter!

The newest and hottest 2-Meter rig, is the Wilson WE-800 . . .

It is totally portable, powered by internal rechargeable Ni-Cad batteries, and weighs less than 4 lbs.

The C-MOS synthesizer allows 800 channel selections, and the unit has the feature of a Hi/Lo 1 or 12 watt power option switch (when used as a mobile or base).

Isn't it about time you afford yourself the best in two-meter equipment? The Wilson gear is quite affordable.

For example, the 2-Meter Hand-Held Model 1405 SM is a switchable 1 and 5 watt, six channel unit powered by 10 "AA" rechargeable nickel cadmium batteries.

Tough? You bet . . . the Lexan® outer housing will allow rough and rugged use. 500 milliwatts of audio power will get the signal through even in high noise areas.

1405 SM

Additional features include 600 KHz offset up or down. 2 additional offsets available for non-standard repeaters, and five channel pre-programmed matrix selector.

The WE-800 is truly the ideal equipment for the discriminating amateur who wants a "go anywhere" radio. The Wilson WE-800 is priced under $400.00.

WE-800

Portable 800 Channel Synthesized 2 Meter Radio

Through efficient engineering, the unit provides 60 dB intermodulation protection in heavy RF traffic areas. Separate speaker and microphone are built into the design of the radio.

Wilson 2-Meter Hand-Helds are priced from $192.95 and a complete line of accessories and tone options are available.

Join the thousands of Hams now on the air world-wide with the affordable Wilson portables.

Other Quality Amateur Equipment from Wilson includes Antennas, Rotors, Towers

Want more information and specifications on these products? Contact:

Your Local Dealer or the Consumer Products Division,

Wilson Electronics Corp.

4288 SO. POLARIS • P. O. BOX 19000 • LAS VEGAS • NEVADA • 89119

(702) 739-1931 • TELEX 684-522

Results of the 18th Annual CQ 160 Meter DX Contest

BY DONALD McCLENON*, N4IN/3

There were at least 1875 operators at over 1825 different stations active on 160 meters during the contest weekend. 882 of these operators were DX for W/VE. Logs were received from 139 DX and 126 W/VE stations.

The northeast half of North America experienced snow storms, high winds, and very high static the first night, which severely limited DX contacts. Conditions were so good the second night that most scores ended up higher than last year, setting several new records.

Highest worldwide score was again made by KV4FZ, a whopping 270,648 points. The other six-figure scores were K1PBW 180,432, WA1RFM/VP9 124,816, and multiop WA2SPL 113,444. The Top 10 W/VE single operator score box has a 9th place tie. These two stations had the same multiplier, but much different QSO and DX totals. Note the high placement of K6SE, which shows what can be done from the west coast with an outstanding station run by an excellent operator. The Top 10 DX single operator scores come from 4 different continents. F8DB makes this elite list, and his first operation on this band was approved just a week before the contest.

There is so much multiop interest, that a Top 10 box is now shown for them. It includes two DX groups. Note the outstanding 3rd place spot of west coast W7RM, without benefit of any Europeans. Multiop certificates will be awarded for each foreign country, W/VE call area, and Canadian Province, listing all the participating operators. Multiop scores follow single-op listings, and multiop crews are shown after their scores.

There were 57 countries active, 9 Canadian provinces (No PEI or VE8), and all 50 states, so there was a possible multiplier of 112 (55 DX countries, 9 Provinces, 48 states).

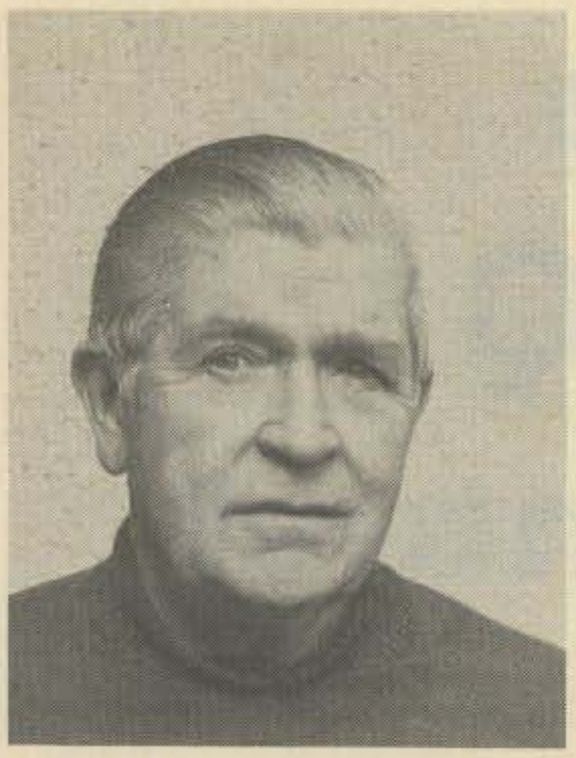
*11310 Cedar Lane, Beltsville, MD 20705

TOP 10 W/VE SINGLE OP

K1PBW	180,432	K8JK	65,512
W3IN	88,160	WA5LES	
W2DXL	80,106	(WA5ZNY Opr.)	62,308
K6SE	77,040	W3HXK	57,368
W4YWX	70,832	N5DX	
K8CCV	67,620	(WA5RTG Opr.)	57,368

We were especially fortunate that through the efforts of W4BRB, F8EX, and others, four French stations were licensed for the very first time on 160 in this contest. There were more on for the ARRL DX contest, and they plan to enter all future contests. Also YU stations had just recently received operating permission and were active. Some of the usually rare prefixes reported active were GC (Jersey), GU, HK, IK, IS, KG4, KJ6, KL7, OA, ST2, TG9, VP1, VP2D, VP2E, VP2L, VP2M, VP2V, VR3, VS6, ZC, ZE, 4X4, 6Y5, 8P6, 9D5, 9HI. In keeping with past rulings for this contest, maritime mobiles EL0N/MM and JA6GG/MM in the Caribbean and Persian Gulf respectively, were counted as countries. Fixed sta-

Top French station F8DB has a real ham shack. His first time on 160, he makes the Top 10 score list!



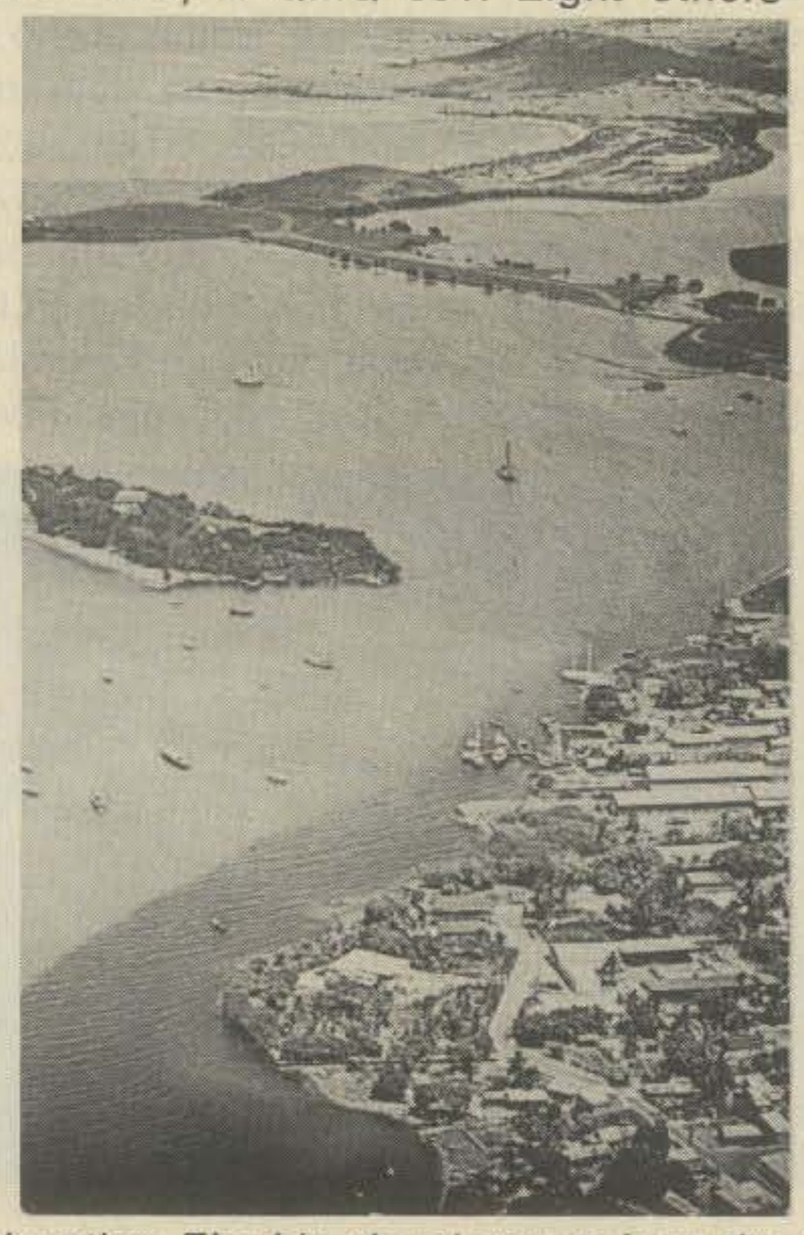
F8EX says he is a 72 year old-timer. He is a leader in getting France on 160.

tion G4EOK was again active on the moored HMS Belfast.

There were at least 311 different G stations active, 165 JA's, 161 OK's, 58 DL's, and 26 GM's. 235 DX stations in 42 different countries made at least one W/VE contact. The larger number of these were 80 G's, 39 JA's, 32 OK's, 12 DL's, and 8 GM's.

A new top multiplier record of 84 was shared by K1PBW and KV4FZ, followed by W2DXL and WA2-SPL at 79, and W3IN, W4YWX, K8JK at 76. Twelve others were above 70. After KV4FZ, outstanding DX station multipliers were YV1OB/60, WA1RFM/VP9 58, YV4BK 55, G3VMW/A 51, DJ5PN, G3UBR 50, and VP2DD 49.

A new record of 35 countries was worked by KV4FZ, followed by K1PBW 33, W2DXL, WA2SPL 30, DJ5PN, OK3KFF, OK5TLG/P, W4YWX 29, and OK2KBA 28. Top QSO leaders were K1PBW 434, W3IN 388, KV4FZ 385, WA2SPL 362, W7RM 361, G3VMW/A 352, K4QMQ 351. Eight others topped 300. A total of 12 Europeans exceeded 200. The following non-Europeans not covered above, made over 100 QSOs: YV1OB 174, KH6CHC 161, YV4BK 159, PJ2VD 138, JA3ONB 125, KH6IJ 123, JA7NI 120, JA2UEO 117, VP2DD 110. W/VE leaders in 10-point QSOs were K1PBW 160, WA2SPL 89, VO1KE 56, K6SE 52, W1MX, W2DXL 51, W3IN, K4YFQ 48. DX leaders in 10-point QSOs were KV4FZ 260, WA1-RFM/VP9 212, YV1OB 141, KH6CHC, YV4BK 131, PJ2VD 124, KH6IJ 100, G3UBR 94, G3VMW/A 79.



KV4FZ location. The big signal comes from the 308 foot tower in upper left corner.

The father/son team of VE1AXT/VE1BCZ used the first of these calls. Two Czech husband/wife teams divided operating time with separate calls: OK1HAS/OK1DDL Ludek/Dagmar and OK2SBB/OK2PGN Miroslav/Ludmila. There were at least two other Czech YL's active: OK1JEN Hana and OL8-CHI Lubica.

Since KV4FZ received the Gene Sykes W4BRB/W4OO "Championship Plaque" last year for winning several past contests, this year's Plaque will go to the highest W/VE scorer and second world high, K1PBW. Single operator certificates are being sent to each State, Province, and Country winner for this 18th Annual Contest. There are a number of stations who would have won one, if they had only sent in logs. Please send in your log, however small, to show your interest and to help in cross-checks.

Speaking of cross checks, several logs were found to have a number of claimed contacts and multipliers which were proved incorrect. Their scores were appropriately reduced. Multipliers are easy to spot, since nearly everyone works the same active ones in places where there are very few or sometimes only one representative, and checking is simple. A master list is made up from all logs received, starting with those known to be accurate. Nearly everyone who makes as many as ten QSOs appears on this list, because at least one of them sends in a log. Claims of "unique" contacts, not worked by anyone else in the contest, are followed up by SASE mail inquiries, and all too often produce proof of no contact. Dupes are spotted by admission of the other station, memory of the checker, and complete checks against the master list for high scorers. Info sent and received is routinely checked for accuracy. Disqualification criteria will be stated prior to the next contest. *CQ* wants certificate winners to be from the good guys (most of you).

If you think it strange that there are no pictures of W/VE stations, it is because none of you sent in any. Our DX friends are way ahead in this area, and thanks to them for brightening up this story.

Plan to be in the next *CQ* 160 Meter Contest the last full weekend of January 1978 (Jan. 27, 28, 29). Invite your friends, alert the DX, and send SASE to *CQ* Magazine for log and summary sheets.

73, Don, N4IN/3

SOAPBOX

DX:

We thank all the top band amateurs who welcomed us so heartily—F8VJ. Very good DX conditions. She was good job, this contest, hi!— JA1-CUW. You struck an exceptional weekend. Have been unable to work N.A. in several weeks since—ZL3GQ. Windstorm blew down antenna before test, two hour power failure at opening, gas generator wouldn't start, rig d.c. power supply trouble, and terrible first night QRN. Otherwise a very fine contest—WA1RFM/VP9. Many thanks for nice contest—OK1DDW. Biggest thrill was working first ever JA/4X4. QSO on 160—JA3ONB. Contest much enjoyed as usual. Had to stop and answer public questions about this museum ship during visiting hours—G4EOK. Wish more Europe could have heard me—9D5A. Only a small entry, but hope it flew the flag for Guernsey—GU4EON. Nice conditions to USA first night and to ZL and VR3 the second—JA2YEF. Mostly looking for new countries, and for once, I didn't find any—GD4BEG. Biggest thrill was VR3AH answering my call. Sure woke me up, hi!—YV4BK. Our 1100 foot Beverage to USA was stolen before contest started. Also had a four hour power outage during the test—GM3IGW/A. I think first USA/F QSO on 160 was W1WY and I—F8EX. Conditions the worst I have seen in 4 years—ZE7JX. First time in this interesting contest, and will do it always from now on. Couldn't reach many W's thru G QRM—YU3EY. Contest a real joy. Pleased so many called me by my first name—VP2DD/W2BP. Couldn't raise any USA with my dipole. Next year, a vertical—DL7BQ. Conditions varied from lousy the first night to terribly noisy the second—OA8V. Hard to get thru G's to provide a new country for USA—YU1PCF. Received license one week before contest. Hard job to build transmitter and antenna Friday afternoon!—F8DB. Authorities only permit 160 operation during international contests. Next year hope to have more power so I can be heard better in the Americas—4X4NJ. We weren't really trying this year—G3KMI. My first attempt at a contest of this type. Found it most enjoyable and educational—GM3ZSP. Never heard conditions this good on 160—OK3KFO. A real challenge to work 160 through the 1.5 Megawatt Loran here on 1850!—KJ6DL. Good conditions second night. The contest is getting more and more interesting—DJ5PN. Our conditions quite good, but we understand not so for USA. Our secret weapon was an inverted V up 150 feet. Will be on next year to get the ones we missed—G3VMW/A. Tropical QRN first night. Second night was better. NA and SA stations in Window made Europe and Africa QSOs impossible—YV1OB. A good contest as usual. Missed lots of DX; some from competition and some from oversleeping—G3YMC. Hope to work USA next time—JG1RJB. Good conditions first night. Second night antenna came down in a storm. In another way, I liked this contest very much—OK1DOK. First ever entry. Nice to hear DX on this band—G3JFF. Couldn't raise any Europe—JA7COI. DX couldn't hear my low power through the G's—PAØLOU. Great contest, and I will be in it next year—JH1LKH. Got 4 new countries, including ZE—OH2BO. Last year was better, but thanks for test. CU next year—LU1DZ. Difficult to work DX in my first Top Band contest—F3AT. I could hear many DX stations that I couldn't QSO—JA2UEO. Good Sunday morning conditions to USA, but it took too many CQs per QSO, so quit early—EI9J. My first entry to this contest—JA1VDJ. I need a better antenna next year—W2ECZ/HK5. It was great fun again—DJ6TK. My first 160 contest, and hope to be in the next—JA3BCT.

Second highest in Japan with 117 QSOs, JA2-UEO worked into USA with this neat station.

USA/Canada:

160 meters is fun!—K2FL. First time on 160, and it's like starting all over in ham radio; a whole new exciting world—WA6EJL. Special thanks to F8EX

Auggie, K9??, the Dog Xray spotting op at W7RM, was said to have dogged determination to duty.

Iran on 160! 9D5A made many Europeans happy with this setup. He seems to enjoy doing it, too.

and W4BRB for their hard work in getting French amateurs permission to operate in the contest—W1HGT. Always lots of fun in this contest. Keep them up! Still enjoy them after 44 years—VE5XU. First 160 contest from western US after 3 years in Florida. Too many western ops in the DX window—W7MRS. The contest seems bigger and better than ever—K1PBW. Never heard better conditions from here—K4TO. A lot of DX compared to previous years—WB6NRK/7. Stiff competition; best band opening in years—K8CCV. Enjoyed working Japan at a time that 20 meter receivers produced only hiss—K7GGD. First night terrible QRN, and lightning struck a tree three blocks from here—W1PL. Couldn't put in full time, but working F8VJ for nr 95 made it all worth while—W4YWX. Always fun working both the "160 only" and the all-band contest hounds at the same time. No Europe heard, but Japan sloper paid off well—W7RM. I had a lot of fun in the contest this year and look forward to giving it a whirl next January—K8OQL. My first 160 contest. My ears will never be the same!—W4BAA. Had 110 more QSOs than last year's five—W3GL.

This gear and an inverted V 30 meters up, enabled JA1-CUW to work well into USA.

Noise forced me off first night. Good opening second night—W5SBX. Cheers! France now on 160!—W1BB. Kites and balloons couldn't be maintained long enough for much operation of phased verticals, but they were great while they lasted—K4-DBZ. Another FB contest. See you next year—K6MO. Cat got her tail across keying bias with spectacular results, including coffee all over last log sheet. Only two illegible entries—WB0PNW. Next year arrange for no August QRN in January! Great to have F and YU on—VO1KE. Again a great contest, even with the first night snow static—W6MZW/1. Always enjoy this contest, but did not feel up to an all-out effort this time—W5SUS. Friday night blizzard made most DX unreadable. Good Sat night conditions nearly closed the gap. Couldn't put up Beverage this time—W3IN. Hope to be back next year with less line noise and more radials—VE5DX. Just returned to 160 after 40 years absence. Enjoyed the contest—W8VSK. Deepfreeze helped band conditions—W9ABA. First night spoiled by QRN. Second night worked more G's than W2's—VE1AXT. I cannot remember a 160 meter contest with such good conditions—WØAIH. 14 inches of snow, 60 m.p.h. wind, lightning, thunder, terrible QRN first night. Second night conditions excellent—WA2SPL. Window full of Europeans, but rough to work any in the pileups—WØNFL. Hope much better conditions next year—VE1CD. First 160 contest in 4 years. Great challenge and fun—W4YZC. Got the last states needed for WAS—W7LDG. In spite of conditions, worked two new W7 states—W4KFB. Had a ball. Looking forward to next year's test—W4DHZ. With WØPHF and WØPSF both active, we had a lot of "sorry worked before" trouble—WØPSF. This turned out to be the most enjoyable 160 test yet, although I would not have thought so Friday night—W4TMR. Excellent first night conditions, even with horrible QRN—W9LT. Japan sure loud first morning. Good fun—W7DG. Next year you will find me plugging away again—K4II. Good conditions to Japan, but no Europe—VE7UZ. Flabbergasted when ZL3GQ answered my CQ. Helped overcome frustration because many Europeans couldn't hear me—WA5RXT. Highlight was making a one-weekend WAC during the contest, which has long been one of my goals—K6SE. Too cold in shack to do much operating—W9PNE. WOW, what a DX opening!—WA4IAR. First time in this exciting and challenging contest, and it will not be the last—W7YN. New location, new antenna, worked some DX—WA6LBP.

Multi-Op Station Crews

W1MX: WA1RJX, W2QHQ, WA4TTG. **WA2SPL:** WA2SPL, WB2OEU. **K4DBZ:** K4DBZ, N4BP. **K4QMQ:** K4QMQ, K4DBV. **W4PRO:** W4PRO, K3RUQ, WA4DUS, W4HBK. **K5PFL:** K5PFL, WB5QWX. **WA5RXT:** WA5RXT, WB5SFX. **WB6CBY:** WB6CBY, WB6CEI. **W7RM:** W7RM, K7JCA, WA7OTT, Auggie (K9 spotter). **W7DG:** WA7GCI, WA7ILC, WA7SHN. **K7GGD:** K7GGD, K7BNN, W7DNU, K7-VPF, WA7WMC, WA7WMD. **K8IA:** K8IA, WA8EDC, K8IDE, WA8JUN. **VE1AXT:** VE1AXT, VE1BCZ. **VE2OJ:** VE2DNW, VE2SD, VE3HJV. **OK5TLG/P:** OL1AVB, OK1FCW, OK1MMW, OK2BTW, OK2PFM. **OK3KFF:** OK3CIW, OK3CMF, OK3-TMR, OK3TPV, OK3YCQ. **OK1KSO:** OK1AEZ, OK1JCW. **OK1KRY:** OK1AHJ, OK1-AQO, OK1DCM. **OK2RGC:** OK2AKG, OK2SVK, OK2-18624, OK2-19160. **G3VMW/A:** G3VMW, G3WPF, G3XUD. **G3KMI:** G3WIE, G3ZER, G3ZYW, G4BIX, G4CXT. **G4BTJ:** G3PDL, G3VIP. **JA2YEF:** JH2IRH, JH2NTZ. **GM3IGW/A:** G3IGW, G4MH.

Number groups after calls denote score, total QSOs, 10-point QSOs, multiplier, and DXCC countries worked. Multi-op scores follow single-op listings.

Connecticut
W1WY 40,320 159 39 64 23
Maine
W1HDC 1,452 25 2 22 4
Massachusetts
K1PBW 180,432 434 160 84 33
W1PL 31,584 162 30 56 18
W1BB 10,920 50 33 30 20
New Hampshire
W6MZW/1 18,666 127 14 51 14
Rhode Island
W1PHW 18 3 0 3 1
New Jersey
K2FL 15,840 145 5 48 6
N2IN 480 20 0 12 2
New York
W2DXL 80,106 303 51 79 30
WA2YJN 3,744 40 8 26 8
W2MNK 1,056 33 0 16 2
Delaware
W3GL 15,400 115 15 44 11
Maryland
W3IN 88,160 388 48 76 25
K3ZZ 29,680 177 22 56 18
LU1BAR/W3 18,630 147 15 45 11 (Opr. CX1EK)
WB2JYM/3 4,212 53 7 26 6
Pennsylvania
W3HXK 57,368 252 38 71 24
W3JSX 28,080 152 27 54 19
W3BUR 26,076 174 18 53 14
W3UHP 12,516 141 2 42 4
W3BGN 11,310 101 11 39 11
W3AP 4,368 62 4 28 4
Alabama
K4TO 28,160 196 15 55 14
Florida
K4YFQ 56,090 203 48 71 27
W4BAA 9,760 74 12 40 12
Georgia
W4YWX 70,832 290 44 76 29
WA4IAR 22,256 178 9 52 11
WB4RUA 13,066 119 5 47 6
WA4GQJ 9,048 68 12 39 12
W4WRY 7,344 46 14 36 15
Kentucky
W4KFB 5,270 81 1 31 3
North Carolina
W4TMR 44,800 254 24 64 16
South Carolina
K4II 18,260 106 15 55 14
K4OAQ 3,276 51 3 26 5
Tennessee
K4PUZ 23,712 227 5 48 7
Virginia
K4CYU 56,516 226 43 71 26
W4DHZ 19,968 152 14 48 10
K4RS 17,336 125 18 44 13
K4TS 17,100 127 11 50 11
W4YZC 16,008 122 13 46 11
W4NVN 11,440 131 3 40 5
N4MM 11,172 107 10 38 7
W4ZM 6,072 80 3 33 5
W4KMS 2,352 41 2 24 4
Arkansas
N5DX 57,368 308 24 71 21 (Opr. WA5RTG)
W5SUS 47,472 244 25 69 19
New Mexico
W5HM 2,090 55 0 19 2
Texas
WA5LES 62,308 297 31 74 25 (Opr. WA5ZNY)
W5SBX 30,508 175 22 58 19
W5ZSX 24,852 166 13 57 14
W5FIX 14,444 109 12 46 12
K5LZO 9,360 88 8 39 10
W5QF 8,774 95 3 41 5
K5JVF 2,700 19 14 18 15
California
K6SE 77,040 327 52 72 23
WA6NGG 24,174 177 15 51 13 (Opr. K6PJY)
W6MTJ 17,480 158 8 46 8
K6MO 15,488 128 12 44 10
W6PRP 12,056 117 5 44 6
K6NA 10,004 90 8 41 9
WA6EJL 9,048 96 5 39 7
WA6LBP 4,212 57 6 26 7
K6TG 3,952 72 1 26 3
WB6HDH 2,120 49 1 20 3
Arizona
K7NN 20,488 145 13 52 11
WB6NRK/7 15,570 133 10 45 11
Idaho
W7LDG 6,800 88 3 34 5
W7IWU 1,156 34 0 17 2
Montana
W7LR 3,536 68 0 26 2
Nevada
W7MRS 36,708 238 21 57 11
W7YN 29,568 220 11 56 11 (Opr. K6ILB)
Utah
W7ZC 11,004 119 3 42 5
Washington
K3MNT/7 22,464 180 9 52 10
W7HAD 13,840 137 9 40 7
W7BYK 3,220 50 5 23 6
Wyoming
W7TO 126 9 0 7 1
Michigan
W8VSK 23,484 170 9 57 11
WA8TDY 4,800 80 0 30 2
Ohio
K8CCV 67,620 319 41 70 22
K8JK 65,512 307 31 76 26
W8IBX 4,760 56 3 35 5
W8EX 2,912 44 3 26 5
West Virginia
K8OQL 26,606 223 7 53 7
Illinois
W9YYG 51,680 276 26 68 20
W9DL 44,748 263 19 66 17
K9BGL 24,852 170 12 57 13
W9OHH 13,140 138 2 45 4
W9ABA 9,200 107 2 40 4
W9PNE 7,684 85 7 34 7
W9UDK 5,848 78 2 34 4
Indiana
W9LT 46,784 256 22 68 19
W9JOO 24,174 209 7 51 9
Iowa
WØNFL 10,250 101 6 41 8
Kansas
WØLNZ 22,790 199 4 53 6
WØPSF 7,520 70 6 40 8
WØIUB 5,874 89 0 33 2
Minnesota
WØHW 12,768 144 2 42 4
Missouri
WBØPNW 29,812 213 11 58 12
WØEO 26,510 221 5 55 7
Nebraska
WØAIH 54,864 293 22 72 21

CANADA
Newfoundland
VO1KE 24,092 93 56 38 19
New Brunswick
VE1CD 16,810 137 17 41 11
Quebec
VE2WA 1,120 28 0 20 2
Ontario
VE3BMV 52,224 280 26 68 19
VE3IXE 42,714 283 14 63 16
Saskatchewan
VE5DX 30,996 251 9 54 9
VE5XU 3,618 51 4 27 5
Alberta
VE6WX 16,280 153 8 44 9
British Columbia
VE7UZ 41,724 230 28 61 14
Argentina
LU1DZ 1,704 17 12 12 5
Bermuda
WA1RFM/VP9 124,816 229 212 58 16
Colombia
W2ECZ/HK5 312 8 3 6 6
Czechoslovakia
OK2KBA 28,148 224 8 31 28 (Opr. OK2PGF)
OK1DOK 22,204 185 15 28 22
OK1DKW 16,401 186 5 22 20
OK1MAC 13,100 178 1 20 20
OL5AUZ/P 12,640 172 1 20 20
OK2BGW/P 12,306 155 3 21 20
OK3KFO 9,844 116 2 23 22
OK2PGU 9,552 95 8 24 21
OL4ATY 9,253 132 3 19 18
OK1JEN 8,449 138 1 17 17
OK3CCC 8,440 122 2 20 19
OK1JER 7,856 142 0 16 16
OK1KZJ 7,712 139 0 16 16
OK1AXD 6,570 126 0 15 15
OK1HAG 5,908 127 0 14 14
OK2PCW 5,908 124 0 14 14
OK1MCW 5,808 104 1 16 16
OK1MNW 5,746 128 0 13 13
OK2BHT 5,348 110 0 14 14
OK3CEG 5,306 107 0 14 14
OK1HAS 5,100 76 2 20 19
OLØCFI 5,096 111 1 13 13
OK3FON 4,928 103 1 14 14
OK3TAO 4,849 116 0 13 13
OK3KAP 4,746 108 0 14 14 (Opr. OL8CCS)
OK2HI 4,560 80 1 16 16
OK3CEI 4,264 101 0 13 13
OL8CGI 4,144 94 0 14 14
OK1AYY 4,080 66 1 15 15
OK1DDW 3,732 97 0 12 12
OL9CFE 3,458 67 1 14 14
OK1HCH 3,380 81 1 13 13
OK1DDL 3,276 74 1 14 14
OL8CHI 3,185 76 0 13 13
OK2YN 2,916 69 0 12 12
OK2BPL 2,796 66 1 12 12
OK2BQP 2,662 78 1 11 11
OK1DJK 2,652 57 0 13 13
OK2BUV 2,613 72 0 13 13
OK1DCF 2,590 82 1 10 10
OL8CGD 2,508 77 1 11 11
OL6AUF 2,500 83 0 10 10
OK2SLL 2,200 74 0 10 10
OK1AIJ 2,097 79 0 9 9
OK1AVG 2,050 69 0 10 10
OK2BJJ 2,043 76 0 9 9
OL5ATZ 1,917 73 0 9 9
OK2BQX 1,864 76 0 8 8
OK1AIA 1,632 66 0 8 8
OL8CFY 1,616 77 0 8 8
OL3AUG 1,584 72 0 8 8
OK2SBB 1,528 67 0 8 8
OL8CGS 1,400 62 0 8 8
OK2BQL 1,260 49 0 9 9
OK2PGN 1,128 48 0 8 8
OK3CWQ 872 32 0 8 8
OK1DAC 864 33 0 9 9
OL8CGN 696 49 0 6 6
OK1OXP 606 31 0 6 6
OK1MRA 602 31 0 7 7
OK1ONC 294 17 0 6 6
OK1ARD 92 7 0 4 4
OK3CCT 82 19 0 2 2
OK1DDC 72 9 0 3 3
OK1AZW 36 18 0 1 1
OL5ATW 34 17 0 1 1
Dominica
VP2DD 46,060 110 78 49 20
England
G3UBR 87,250 306 94 50 23 (Opr. G4BCH)
G4EOK 25,534 175 19 34 23
G3YMC 15,246 202 5 20 19
G4BUO 7,362 104 3 18 17
G3XWZ 5,850 84 2 18 18
G3JFF 1,932 33 0 14 14
Finland
OH2BO 21,006 150 8 27 22
OH1MA 8,880 85 5 20 16
OH2KA 8,502 132 0 13 13
France
F8DB 50,349 228 31 39 20
F3AT 26,933 224 12 23 18
F8EX 12,516 110 11 21 15
F8VJ 9,482 72 16 22 13
Germany Fed. Rep.
DJ5PN 83,700 268 77 50 29
DL3LU 24,381 175 14 27 20
DJ8FRA 15,070 132 8 22 18
DJ6TK 12,054 122 3 21 20
DL7BQ 6,852 119 0 12 12
DL7HU 6,288 112 0 12 12
DK6AJ 4,692 83 0 12 12
Guernsey
GU4EON 4,690 66 1 14 14
Hawaii
KH6CHC 62,651 161 131 43 11
KH6IJ 40,032 123 100 36 9
Iran
9D5A 2,280 38 0 12 12
Ireland
EI9J 32,472 168 30 33 20
Israel
4X4NJ 3,910 47 0 17 17
Japan
JA3ONB 5,060 125 24 11 8
JA2UEO 3,610 117 14 10 7
JA7NI 2,872 120 13 8 6
JA1CUW 2,763 97 13 9 6
JA7COI 2,016 89 8 8 6
JA1VDJ 780 34 11 2 2
JG1RJB 182 44 0 2 2
JR6CF 66 15 0 2 2
KA6DX 46 10 0 2 2
JA3BCT 16 8 0 1 1
Johnston Is.
KJ6DL 19,575 77 68 27 9
Netherlands
PAØINA 4,984 73 0 14 14
PAØTA 2,167 40 0 11 11
PAØLOU 1,890 39 0 10 10
PAØPN 810 18 0 9 9
Netherlands Antilles
PJ2VD 60,260 138 124 46 12
New Zealand
ZL3GQ 11,172 69 39 21 8
Northern Ireland
GI6YM 40,324 207 31 34 19
Peru
OA8V 8,925 44 41 21 4
Rhodesia
ZE7JX 399 11 1 7 7
Scotland
GM3ZSP 16,866 195 2 18 18
Venezuela
YV1OB 94,320 174 141 60 23
YV4BK 79,420 159 131 55 20
Virgin Islands
KV4FZ 270,648 385 260 84 35
Wales
GW3GWX 8,820 126 0 14 14
Yugoslavia
YU3EY 32,625 221 9 29 24
YU1PCF 24,975 181 7 27 24
YU3CM 102 8 0 3 3

MULTI OPERATORS
Massachusetts
W1MX 48,800 196 51 61 21
New York
WA2SPL 113,444 362 89 79 30
Florida
K4DBZ 34,338 167 31 59 20
Georgia
K4QMQ 69,552 351 33 72 26
Virginia
W4PRO 49,790 251 33 65 22
Texas
K5PFL 58,800 324 24 70 20
WA5RXT 49,000 262 22 70 21
California
WB6CBY 1,770 43 4 15 5
Washington
W7RM 75,686 361 43 71 21
W7DG 32,130 203 28 51 12
K7GGD 26,316 202 14 51 10
Michigan
K8IA 51,912 340 18 63 14

CANADA
New Brunswick
VE1AXT 23,424 140 26 48 15
Quebec
VE2OJ 9,250 117 2 37 4
Czechoslovakia
OK5TLG/P 42,624 271 15 36 29
OK3KFF 31,076 218 11 34 29
OK1KSO 21,270 160 16 30 22
OK2RGC 2,590 86 0 10 10
OK1KRY 1,233 49 0 9 9
England
G3VMW/A 90,780 352 79 51 24
G3KMI 25,344 125 43 33 17
G4BTJ 15,944 193 7 22 19
Japan
JA2YEF 2,421 87 10 9 7
Scotland
GM3IGW/A 67,650 295 41 41 22

Check logs are gratefully acknowledged from the following: W1HGT, K3DR, GD4BEG, GI5UR, OK1GS, OK1MNO and OK2BOB.

TOP 10 MULTIOPS

WA2SPL	113,444	K5PFL	58,800
G3VMW/A	90,780	K8IA	51,912
W7RM	75,686	W4PRO	49,790
K4QMQ	69,552	WA5RXT	49,000
GM3IGW/A	67,650	W1MX	48,800

TOP 10 DX SINGLE OP

KV4FZ	270,648	YV4BK	79,420
WA1RFM/VP9	124,816	KH6CHC	62,651
YV1OB	94,320	PJ2VD	60,260
G3UBR	87,250	F8DB	50,349
DJ5PN	83,700	VP2DD	46,060

CQ Reviews:

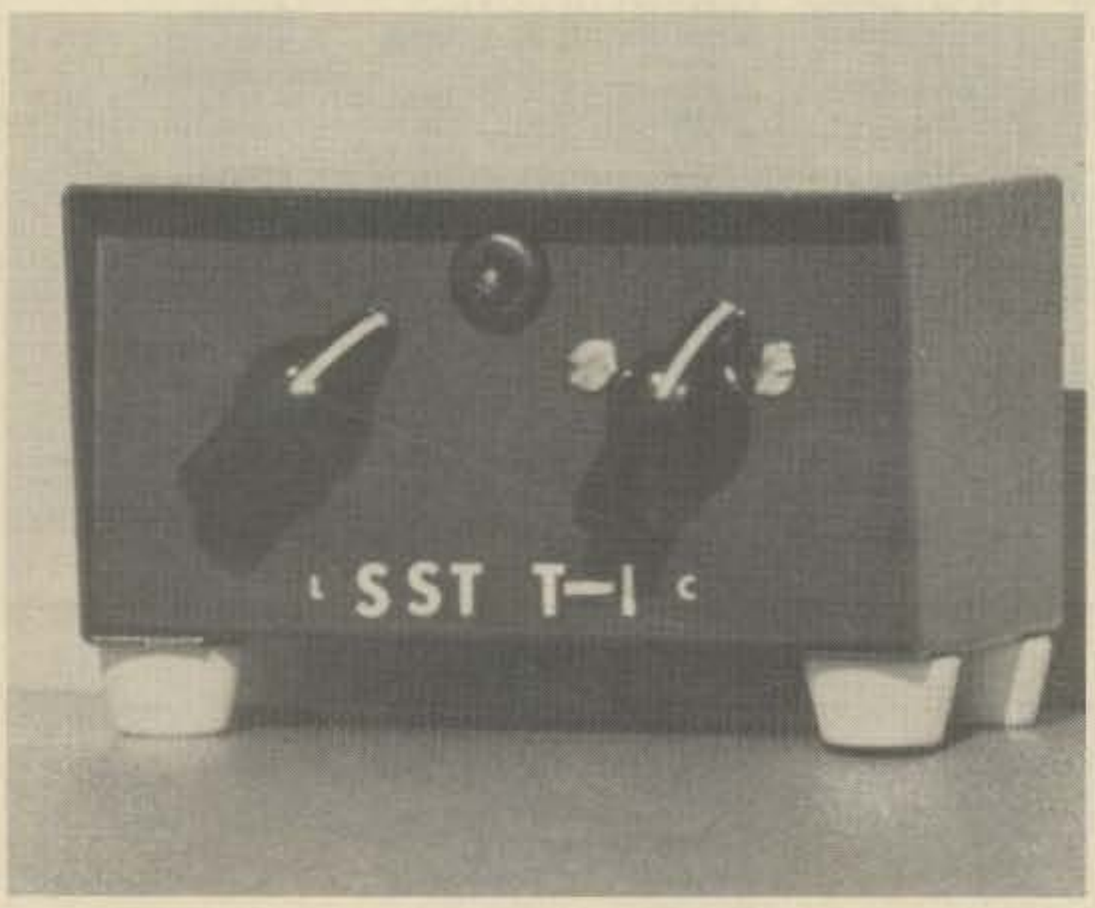
The SST T-1 Random Wire Antenna Tuner

BY HUGH R. PAUL*, W6POK

In attempting to evaluate the "on air" performance of several new transceivers with 160 meter capability, I encountered a problem. My particular suburban piece of real estate was not large enough to erect a full size 160 meter antenna. It was going to be necessary to construct a random wire tuner if I wanted to operate those transceivers on "top band".

Searching through the junk box I call a garage, I came across a variable inductor and a variable capacitor from an old kilowatt amplifier project that never was completed. They were a bit large but would do the job if a suitable cabinet could be located. Fortunately the project was delayed until the following weekend, because a couple of days later the parcel delivery service left a package from SST Electronics. Inside was a small green cabinet housing of all things, an SST T-1 random wire antenna tuner and a note which said "try it, you might like it". Not being one to question providence, I proceeded to do just that.

*291 Macalester Drive, Walnut, CA 91789



The SST T-1 random wire antenna tuner.

The SST tuner consists of a toroid inductor and variable capacitor in an L type circuit. The ten position switch on the left selects the appropriate taps on the inductor, while the right hand knob is for adjusting the variable capacitor. Centered between the knobs is a small neon tuning indicator. Input to the tuner is by means of a standard coax connector. The antenna and ground connections are made at a screw type terminal strip adjacent to the input connector on the rear of the unit.

The tuning procedure is simple enough, especially when used with a transceiver. Merely tune the tapped inductor and then the variable capacitor for maximum received signal strength and you will find that you are very close to resonance when transmitting. Final touch up is quite easy by observing the neon indicator. It is suggested that you place the transmitter in the tune position while making the final adjustments. This will prevent damage to the final amplifier should you be a bit slow in making the adjustments. If an s.w.r. bridge is placed in the line between the transmitter and the tuner, you can adjust the tuner for absolute minimum s.w.r.

With the unit connected to the shorted feedline of my 40 meter ground plane I could obtain a low s.w.r. on all bands, 160 through 10 meters. In some cases this may not be possible on all bands depending on the length of the wire you are attempting to load. By lengthening or shortening the wire you should be able to find a length that will load well on all bands.

The SST T-1 is rated at 200 watts, which makes it suitable for most transceivers. The small size lends itself to portable operation. At a price of $29.95, I believe this is the lowest cost random wire tuner on the market. It carries a one year warranty and a 10 day money back guarantee if you are not pleased with its performance. They were correct when they thought I might like it. For more information contact SST Electronics, P.O. Box 1, Lawndale, California 90260. ■

LEADING THE NEW WAVE...

IC-211

THE NEW ICOM 4 MEG, MULTI-MODE, 2 METER RADIO

ICOM introduces the first of a great new wave of amateur radios, with new styling, new versatility, new integration of functions. You've never before laid eyes on a radio like the **IC-211,** but you'll recognize what you've got when you first turn the single-knob frequency control on this compact new model. The **IC-211** is fully synthesized in 100 Hz or 5 KHz steps, with dual tracking, optically coupled VFO's displayed by seven-segment LED readouts, providing any split. The **IC-211** rolls through 4 megahertz as easily as a breaker through the surf. With its unique ICOM developed LSI synthesizer, the **IC-211** is now the best "do everything" radio for 2 meters, with FM, USB, LSB and CW operation.

The **IC-211** is so new that your local dealer is still playing with his demo. Just hang in there and you can grab this new leader for yourself. ICOM's new wave is rolling in.

Frequency Coverage: 144 to 148 Mhz
Synthesizer: LSI based 100 Hz or 5 KHz PLL, using advanced techniques
Modes: SSB (A3J), FM (F3), CW (A1)

Selectivity: SSB ± 2.4 KHz or less at −60db
FM ± 16 KHz or less at −60db
Sensitivity: SSB 0.25 uv 10db SINAD
FM 0.4 uv for 20db Q.S.

Power Supply: Internal, 117V AC or 13.8V DC
Power Output: 10W PEP (SSB), 10W (CW, FM)
Size: 111mm H x 241mm W x 264mm D
Weight: 6.8 kg

VHF/UHF AMATEUR AND MARINE COMMUNICATION EQUIPMENT

Distributed by:

ICOM

ICOM WEST, INC.
Suite 3
13256 Northrup Way
Bellevue, Wash. 98005
(206) 747-9020

ICOM EAST, INC.
Suite 307
3331 Towerwood Drive
Dallas, Texas 75234
(214) 620-2780

ICOM CANADA
7087 Victoria Drive
Vancouver B.C. V5P 3Y9
Canada
(604) 321-1833

CQ World-Wide DX Contest All-Time Phone Records

BY FREDERICK CAPOSSELA, K6XX/K6SSS

In the records listed below, boldface listings denote world records. Number groups after calls are: year of operation, total score, contacts, zones, and countries. All-band and Multi-Operator records include a band-by-band breakdown of the world leader in each category.

Single Operator/Single Band

WORLD RECORD HOLDERS

1.8	**KV4FZ ('76)**	**37,584**	**380**	**11**	**37**
3.5	KV4FZ ('75)	275,319	1297	23	80
7.0	HR1RF ('72)	399,542	1349	28	93
14	**FY7AK ('76) (Opr. F5QQ)**	**1,415,329**	**2950**	**36**	**127**
21	CW4CR ('70)	1,196,085	2462	39	126
28	KG6SL ('72)	933,577	2467	33	94

AFRICA

1.8	No Entrant				
3.5	EA8CR ('76)	200,850	657	20	83
7.0	EA8CR ('74)	253,528	639	31	103
14	CR6WW ('74)	1,058,446	2152	35	132
21	CR6NO ('73)	658,668	1706	34	97
28	CR6CN ('72)	650,160	1737	31	95

ASIA

1.8	4X4UR ('74)	1,188	35	3	9
3.5	VE3MR/4X ('71)	197,106	742	22	69
7.0	VE3MR/4X ('72)	215,840	643	27	88
14	K2IZN/4X ('76)	829,962	2056	34	113
21	JA1RJW ('69)	379,136	1197	37	91
28	4X4JU ('69)	570,836	1522	34	99

EUROPE

1.8	PAØHIP ('74)	5,200	249	4	16
3.5	I3MAU ('75)	113,535	778	18	69
7.0	OH5NW ('75)	167,751	798	29	80
14	OH2BH ('75)	981,815	2098	37	142
21	G3HCT ('69)	832,016	2124	37	112
28	DL4PM ('68)	614,544	1858	34	84

NORTH AMERICA

1.8	**KV4FZ ('76)**	**37,584**	**380**	**11**	**37**
3.5	KV4FZ ('75)	275,319	1297	23	80
7.0	**HR1RF ('72)**	**399,542**	**1349**	**28**	**93**
14	KV4FZ ('71)	1,208,180	2680	40	153
21	VE3MR ('69)	550,212	1292	39	117
28	KP4AST ('70)	630,180	2010	31	104

OCEANIA

1.8	KH6CHC ('76)	324	15	5	4
3.5	ZL1AMO ('75)	48,384	295	21	35
7.0	VR3AH ('76)	308,750	1111	30	65
14	VK6HD ('72)	706,251	1483	37	132
21	KG6AQY ('70)	749,529	2353	32	72
28	**KG6SL ('72)**	**933,577**	**2467**	**33**	**94**

SOUTH AMERICA

1.8	HK4EB ('76)	3,672	34	4	9
3.5	YV4AGP ('72)	72,666	388	18	48
7.0	CX4CR ('76)	363,110	1125	30	80
14	**FY7AK ('76) (Opr. F5QQ)**	**1,415,329**	**2950**	**36**	**127**
21	**CW4CR ('70)**	**1,196,085**	**2462**	**39**	**126**
28	CV4CR ('75)	668,624	1745	30	101

Single Operator/All Band

AF	**ZD3X ('74)**	**6,653,881**	**4611**	**115**	**372**
AS	XU1DX ('74)	2,607,750	2711	133	342
EU	CT4AT ('76)	3,077,930	2746	110	356
NA	KV4FZ ('70)	4,961,551	4362	128	369
O	KH6RS ('72) (Opr. K2SIL)	5,331,072	4739	128	256
SA	FY7AK ('75) (Opr. F5QQ)	6,636,348	4586	126	372

WORLD RECORD

Station	Band	Contacts	Zones	Countries
ZD3X	1.8	10	5	5
Opr.	3.5	225	12	34
OH2BH	7.0	288	19	57
(1974)	14	1184	27	96
6,653,881	21	1771	26	89
	28	1133	26	91
	Total	4611	115	394

Multi-Operator/Single Xmtr.

AF	EA8CR ('75)	4,673,005	3027	120	403
AS	4J9B ('76)	4,697,238	3272	135	411
EU	DLØWU ('75)	4,208,312	3237	111	367
NA	VP2G ('76)	5,886,500	5312	111	389
O	KG6SW ('73)	2,662,968	2928	113	195
SA	**PY2CAB ('74)**	**6,959,474**	**4495**	**130**	**397**

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	—	—	—
PY2CAB	3.5	13	5	7
(1974)	7.0	48	18	23
6,959,474	14	1535	39	154
	21	1993	36	127
	28	906	32	86
	Total	4495	130	397

Muti-Operator/Multi-Xmtr.

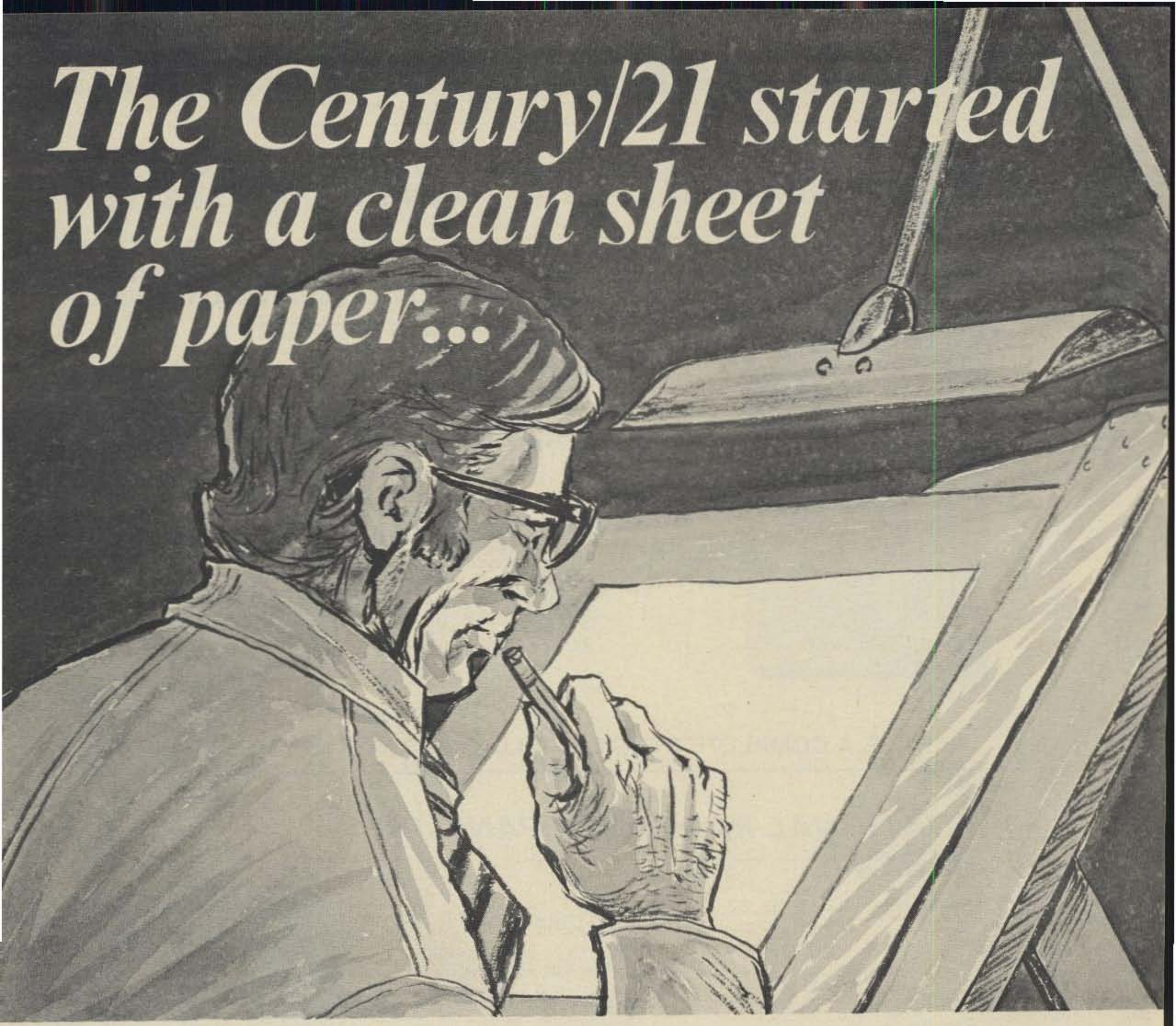
AF	ZD3X ('72)	14,501,872	8571	141	455
AS	4Z4HF ('71)	6,106,290	3994	125	409
EU	OH5SM ('69)	11,593,925	6771	153	526
NA	VP5M ('76)	10,533,172	7783	136	462
O	KS6DH ('72)	5,488,856	5304	116	242
SA	**PJ9JR ('74)**	**19,469,094**	**10043**	**142**	**519**

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	36	7	15
PJ9JR	3.5	663	18	63
(1974)	7.0	1104	26	102
19,469,094	14	3804	35	157
	21	2032	31	109
	28	2404	25	73
	Total	10043	142	519

Club Record: Potomac Valley Radio Club ('76) 58,759,204

The Century/21 started with a clean sheet of paper...

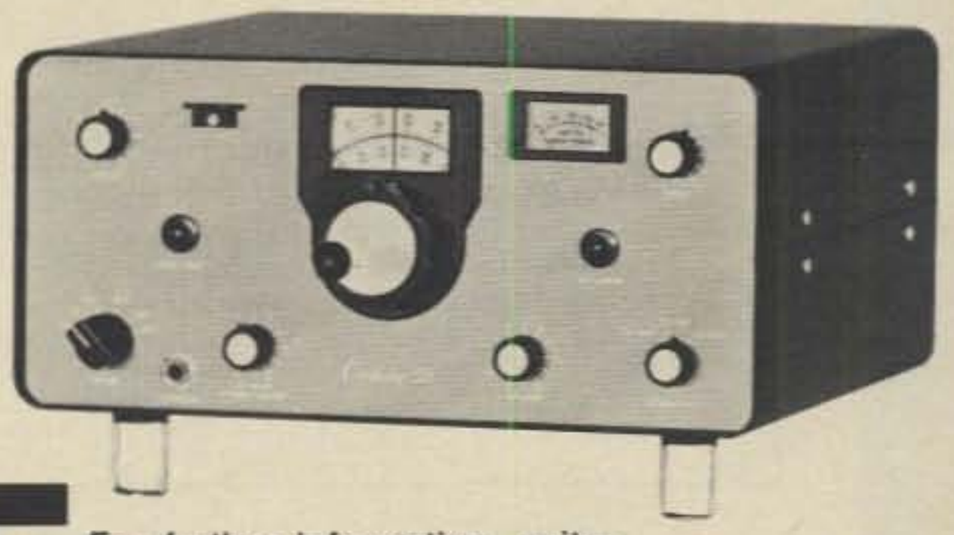


OBJECTIVE: To design a no-compromise HF transceiver for the beginning Ham or Old Timer and at an economical, affordable price.

CRITERIA: Cw transmit, cw and ssb receive. Full break-in. 70 watts input. Full band coverage 80-15 meters, 1 MHz on 10. All solid state. Instant, no-tune band change. Built-in regulated power supply. Overload protection. Linear crystal mixed VFO. Direct frequency readout. Offset receiver tuning, defeatable. Built-in speaker. Sensitive receiver section. High selectivity — three position. Sidetone with adjustable level. Full line of matching accessories.

THE RESULT . . . TEN TEC *Century/21*

The Century/21 was designed and tooled from scratch for high performance cw. A unique Double Direct Conversion receiver performs as well as the conventional superhet. Broadband transmitter with instant break-in is a highly desired luxury. Accessory keyer and crystal calibrator available now, with additional accessories to follow. And . . .



THE AFFORDABLE PRICE:

Century/21, Model 570	$289.00
Century Keyer, Model 670	29.00
Century Calibrator, Model 276	29.00

For further information, write:

TEN-TEC, INC.
SEVIERVILLE, TENNESSEE 37862
EXPORT:5715 LINCOLN AVE., CHICAGO, ILL. 60646

WE HAVE WHAT YOU NEED AT...

BIRD THRULINE® WATTMETER

MODEL 43

- BUY ONLY THE ELEMENTS YOU NEED AND ADD EXTRA RANGES AT ANY TIME
- READ RF WATTS DIRECTLY

Table 1
STANDARD ELEMENTS

Power Range	Frequency Bands (MHz) 2-30	25-60	50-125	100-250	200-500	400-1000
5 watts	—	5A	5B	5C	5D	5E
10 watts	—	10A	10B	10C	10D	10E
25 watts	—	25A	25B	25C	25D	25E
50 watts	50H	50A	50B	50C	50D	50E
100 watts	100H	100A	100B	100C	100D	100E
250 watts	250H	250A	250B	250C	250D	250E
500 watts	500H	500A	500B	500C	500D	500E
1000 watts	1000H	1000A	1000B	1000C	1000D	1000E
2500 watts	2500H					
5000 watts	5000H					

Table 2
LOW-POWER ELEMENTS

1 watt	Cat. No.	2.5 watts	Cat. No.
60-80 MHz	060-1	60-80 MHz	060-2
80-95 MHz	080-1	80-95 MHz	080-2
95-125 MHz	095-1	95-150 MHz	095-2
110-160 MHz	110-1	150-250 MHz	150-2
150-250 MHz	150-1	200-300 MHz	200-2
200-300 MHz	200-1	250-450 MHz	250-2
275-450 MHz	275-1	400-850 MHz	400-2
425-850 MHz	425-1	800-950 MHz	800-2
800-950 MHz	800-1		

WE HAVE A COMPLETE STOCK OF ALL BIRD WATTMETERS AND SLUGS

NATIONAL RADIO COMPANY, INC.
NRCI

NCX-1000

The only 1000 watt, "single package" transceiver. Heavy duty design . . . results of 50 years of design leadership in amateur equipment. State of the art speech processing, linear amplifier, power supply, all in one package. Nothing extra to buy. Covers all amateur bands in the HF spectrum . . . AM, SS' CW' **$1,600**

NCL-2000

Linear Amplifier. A full 10 dB gain. 20 watts in 2000 watts out. Can be driven with one watt. Continuous duty design utilizes two 8122 ceramic tetrode output tubes, designed for both AM and SSB operation. The industry standard for 12 years. Thousands in use all over the world.

$1,200

HRO-500

The ultimate short wave receiver. This synthesized (phase lock loop) receiver incorporates all facilities for AM, Single Side Band (SSB), and CW receiption in all frequencies from the bottom of the very low frequency band (VLF) to the top of the high frequency band (HF). National's "dead accurate" dial means no searching for transmissions. Dial up the frequency and it's there: aeronautical, marine, CB, amateur, military, etc. Continuous coverage.

$3,000

USED GEAR • TRADE UP • FREE UPS SHIPPING ON PREPAID ORDERS

$2,000,000 HAM INVENTORY

HAMTRONICS-WHERE THE HAM IS KING

THE LOWEST POSSIBLE PRICES

ICOM

VHF/UHF AMATUER & MARINE EQUIPMENT

VHF/UHF AMATEUR & MARINE EQUIPMENT

IC-245. 146 MHz FM 10W XCVR. LSI synthesizer with 4 digit LED readout. Xmit & Rcv frequencies independently programmable. 60 dB spurious attenuation.
$499.00

IC-215. 2 METER FM PORTABLE. Three narrow filters for superb performance. 3W or 400 mW. 15 CH. capacity. MOS FET RF Amp & 5 tuned ckts. S-meter front panel.
$229.00

$249.00

IC-502. 6 METER SSB & CW PORTABLE. XCVR. Includes antenna & battery pack. 3W PEP & stable VFO for fun & FB QSO's. Covers first 800 KHz of 6M band, where most activity is.

IC-211. 4 MEG, MULTI-MODE 2M XCVR. 144-145 MHz on SSB & CW, plus 146-147 MHz on FM. Work AMAT OSCAR six or seven. LSI synthesizer with 7 digit LED. MOS FET RF Amp, 5 helical cavities, FET mixer & 3 I.F. filters.
$749.00

$299.00

IC-22S. 145 MHz FM 10W XCVR. CMOS synthesizer can be set to any 15 KHz ch. between 146 & 148 MHz by diode matrix board. Spurious attenuation far better than FCC spec. 10W or 1W. IDC modulation control.

IC-21A. 146 MHz FM 10W XCVR. MOS FET RF Amp & 5 helical resonator filter, plus 3 I.F. filters. IDC modulation control. Variable output pwr: 500 MW to 10W Front panel discriminator meter. SWR bridge. 117 VAC and 13.6 VDC pwr supplies.
$399.00

DV-21. DIGITAL VFO. Use with IC-21A to complete 2M band.
$299.00

IC-202. 2 METER SSB PORTABLE XCVR. Puts sideband in your hand! Internal C batteries or external 12 VDC. 3W PEP. True I.F. noise blanker. 144.0, 144.2 on two other 200 KHz bands, selectable. Hamtronics stocks 145.2 and 145.8 - 146.0 MHz for calling frequency & satellite band.
$259.00

IC-30A. 450 MHz FM LOW XCVR. 1W or 10W. Low noise MOS-FET RF Amp & 5 section helical filter. 22 CH. capacity. S-meter & relative power output meter. IDC modulation control.
$399.00

MASTERCHARGE & BANKAMERICARD ACCEPTED

THE BIG 'H' FOR ALL YOUR HAM NEEDS!

HAMTRONICS
DIVISION OF TREVOSE ELECTRONICS
4033 Brownsville Rd • Trevose, Pa. 19047
(215) 357-1400/(215) 757-5300

WE HAVE WHAT YOU NEED AT...

HAMTRONICS-WHERE THE HAM IS KING

DenTron 3 Kilowatt Tuner Matches Everything From 160 to 10

160-10 MAT

Built-In Wattmeter

Front Panel Antenna Selector for Coax, Balanced Line and Random Wire.

only $229.50

1000 to 1200 WATTS OUTPUT TO YOUR ANTENNA

DenTron SUPER AMP

$499.50

If the amplifier you're thinking of buying doesn't deliver at least 1000 to 1200 watts output, to the antenna, you're buying the wrong amplifier.'

Our New Super Amp is sweeping the country because hams have realized that the DenTron Amplifier will deliver to the antenna, (output power), what other manufacturers rate as input power.

The Super Amp runs a full 2000 watts P.E.P. input on SSB, and 1000 watts DC on CW, RTTY or SSTV 160-10 meters, the maximum legal power.

The Super Amp is compact, low profile, has a solid one-piece cabinet assuring maximum TVI sheilding.

The heart of our amplifier, the power supply, is a continuous duty, self-contained supply built for contest performance.

We mounted the 4 - 811 A's, industrial workhorse tubes, in a cooling chamber featuring the on-demand variable cooling system.

The hams at DenTron pride themselves on quality work, and we fight to keep prices down. That's why the dynamic DenTron Linear Amplifier beats them all at $499.50.

NOW AVAILABLE WITH 572 B's FOR **$574.50**

DenTron Super Tuner

160-10 Meters
Balanced Line,
Coax, Random
or Long Wire

Maximum Power Transfer, Xmitter to Antenna.

1 KW Model $129.50 3 KW Model $229.50

DenTron ANTENNAS

The Sky Openers

SKYMASTER

A fully developed and tested 27 foot vertical antenna covers entire 10, 15, 20, and 40 meter bands using only one cleverly applied wave trap. A full 1/4 wave antenna on 20 meters. Constructed of heavy seamless aluminum with a factory tuned and sealed HQ Trap, SKYMASTER is weatherproof and withstands winds up to 80 mph. Handles 2 KW power level and is for ground, roof or tower mounting. Radials included in our low price of

$84.50

Also 80 m resonator for top mounting on SKYMASTER.

$29.50

SKYCLAW

A tunable monoband high performance vertical antenna, designed for 40, 80, 160 meter operation. SKYCLAW gives you the following spectrum coverage:

BAND (Meters)	BANDWIDTH (kHz)
160	50
80	200
40	entire band

Tuning is easy and reliable. Rugged construction assures that this self-supporting unit is weatherproof and survives nicely in 100 mph winds.. Handles full legal power limit.

$79.50

EX-1

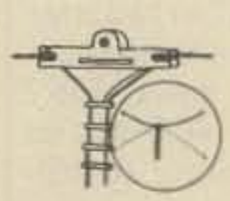
The DenTron EX-1 Vertical Antenna is designed for the performance minded antenna experimenter. The EX-1 is a full 40 meter, ¼ wave, 33', self-supporting vertical. The EX-1 is the ideal vertical for phasing.

$59.50

TRIM-TENNA

The antenna your neighbors will love. The new DenTron Trim-Tenna with 20 meter beam is designed for the discriminating amateur who wants fantsatic performance in an environmentally appealing beam. It's really loaded! Up front there's a 13 foot 6 inch director with precision Hy-Q coils. And, 7 feet behind is a 16 foot driven element fed directly with 52 ohm coax. The Trim-Tenna mounts easily and what a difference in on-the-air performance between the Trim-Tenna and that dipole, long wire or inverted Vee you've been using. 4 & 6 Forward Gain Over Dipole.

$129.50



ALL BAND DOUBLET

This All Band Doublet or inverted Type Antenna covers 160 thru 10 meters. Has total length of 130 feet (14 ga. stranded copper) although it may be made shorter if necessary. This tuned Doublet is center fed through 100 feet of 450 ohm PVC covered balanced transmission line. The assembly is complete. Add rope to the ends and pull up into position. Tune with the DenTron Super Tuner and you're on 10 through 160 meters with one antenna! Now just for the DenTron All Band Doublet.

$24.50

DenTron ANTENNA TUNER

The 80-10 Skymatcher

Here's an antenna tuner for 80 through 10 meters, handles 500 w P.E.P. and matches your 52 ohm transceiver to a random wire antenna.

- Continuous tuning 3.2 - 30 mc
- "L" network
- Ceramic 12 position rotary switch
- SO–239 receptional to transmitter
- Random wire tuner
- 3000 volt capacitor spacing
- Tapped inductor
- Ceramic antenna feed thru
- 7" W. 5" H. 8" D., Weight: 5 lbs.

$59.50

DenTron W-2 PAD INLINE WATTMASTER

Read forward and reflected watts at the same time

Tired of constant switching and guesswork?

Every serious ham knows he must read both forward and reverse wattage simultaneously for that perfect match. So upgrade with the DenTron W-2 Dual in line Wattmeter.

$99.50

USED GEAR • TRADE UP • FREE UPS SHIPPING ON PREPAID ORDERS

$2,000,000 HAM INVENTORY

THE LOWEST POSSIBLE PRICES

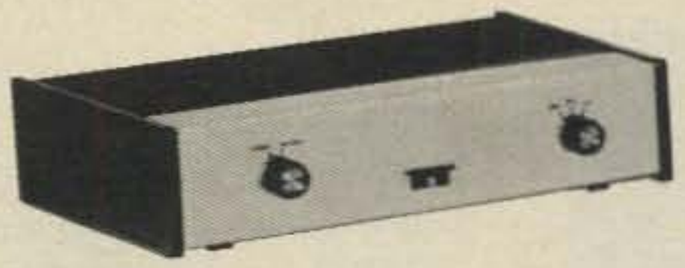
TEN-TEC INC.

TRITON IV EQUIPMENT

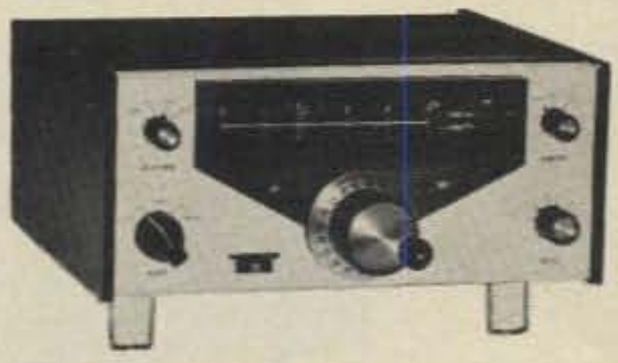
TRANSCEIVERS

MODEL 540-200W, SSB/CW
3.5 - 30 MHz $699.00

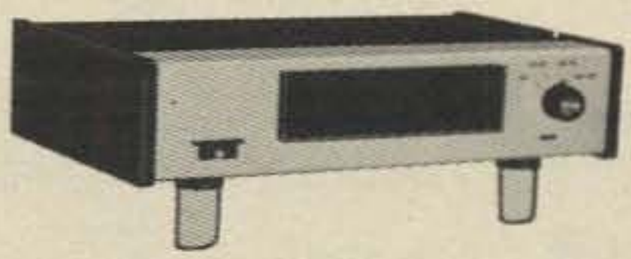
MODEL 544- DIGITAL, 200W
SSB/CW, 3.5 - 30 MHz
$869.00



MODEL 240 $97.00
ONE - SIXTY CONVERTER



MODEL 242 $169.00
REMOTE VFO



MODEL 244 $197.00
DIGITAL READ OUT/COUNTER

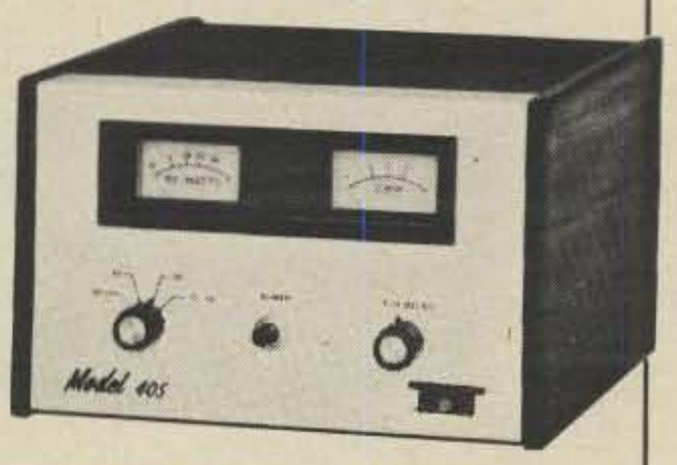
MODEL 262-G $139.00
DELUXE POWER SUPPLY

ARGONAUT

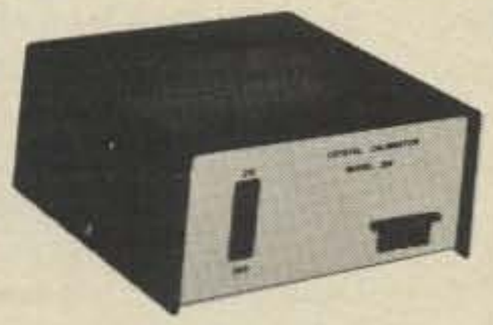
MODEL 509 $359.00
SW, SSB/CW, 3.5-30 MHz

LINEAR AMPLIFIER

MODEL 405 $159.00
100W, 3.5 - 30 MHz

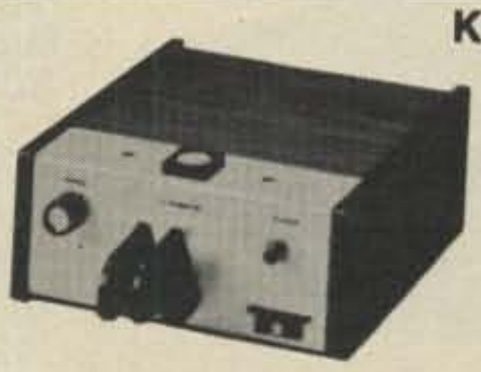


AMMETER
207 $14.00



XTAL CALIBRATOR
206 $29.00

KEYERS



ELECTRONIC KR-50
$110.00

ELECTRONIC
KR20-A $69.50

ELECTRONIC KR-5A
$39.50

KR-2A $17.00

KR1-A **$35.00**

MASTERCHARGE & BANKAMERICARD ACCEPTED

HAMTRONICS

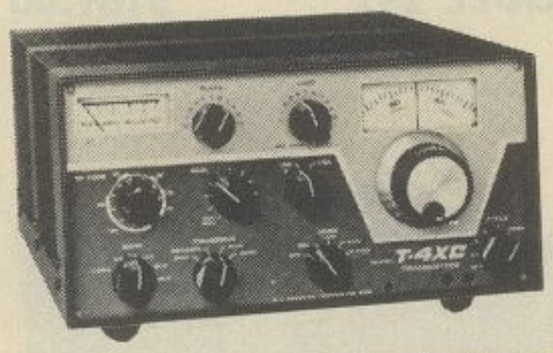
DIVISION OF TREVOSE ELECTRONICS
4033 Brownsville Rd • Trevose, Pa. 19047
(215) 357-1400/(215) 757-5300

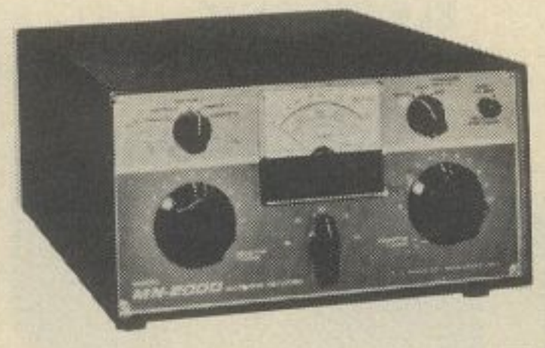
THE BIG 'H' FOR ALL YOUR HAM NEEDS!

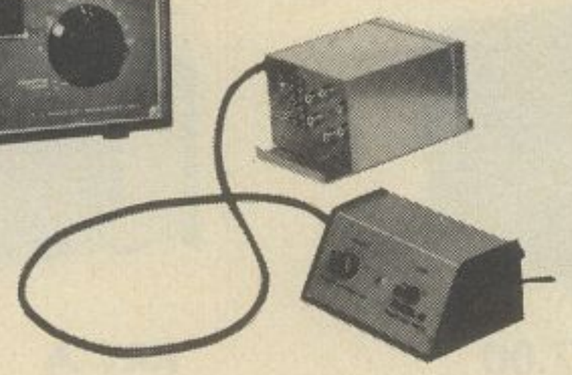
WE HAVE WHAT YOU NEED AT...

DRAKE®

KNOWN FOR QUALITY THROUGHOUT THE WORLD







RECEIVERS

SSR-1	General Coverage, .5 to 300 MHz	$350.00
SPR-4	Programmable, Solid State	$629.00
DSR-2	VLF-HF Digital Synthesized SSB, AM, CW, ISB, RTTY	$2950.00
R-4C	C-Line. HF. 160-10M	$599.00
4NB	Noise Blanker for R-4C	$70.00
5NB	Noise Blanker for SPR-4	$70.00

TRANSMITTER

T-4XC	C-Line. HF. 160-10M	$599.00

TRANSCEIVERS

TR-4CW	80-10M. SSB, AM, CW	$699.00
TR-33C	2M, FM, 12 CH. Portable	$229.95
MMK-33	Mobile/Dash/Desk Mount for TR-33C	$12.95
34PNB	Plug-In Noise Blanker for TR-4 Series	$100.00
MMK-3	Mobile Mount for TR-4	$7.00
RV-4C	Remote VFO for TR-4 CW	$120.00
FF-1	Crystal Control for TR-4	$46.95

SYNTHESIZER

FS-4	General Coverage for 4-Line and SPR-4	$250.00

LINEAR AMPLIFIER

L-4B	Linear and w/power supply & tubes	$895.00

MATCHING NETWORKS

MN-4	Antenna Matching Network. 200W	$120.00
MN-2000	Antenna Matching Network. 1000W	$240.00
RCS-4	Remote Control Antenna Switch	$120.00
W-4	RF Wattmeter, 1.8 to 54 MHz	$72.00
WV-4	RF Wattmeter, 20 to 200 MHz	$84.00
7072	Hand Held Microphone	$19.00
7075	Desk Top Microphone	$39.00
1525EM	Pushbutton Encoding Microphone	$49.95
HS-1	Head Phones	$10.00
AA-10	10W, 2M Amplifier	$49.95
TV-300-HP	300 ohm High Pass TV Set Filter	$10.60
TV-75-HP	75 ohm High Pass TV Set Filter	$13.25
TV-42-LP	Transmitter Low Pass Filter. 100W	$14.60
TV-3300-LP	Transmitter Low Pass Filter. 1000W	$26.60
TV-5200-LP	Transmitter Low Pass Filter. 1000W. 100W, 6M	$26.60

HAMTRONICS-WHERE THE HAM IS KING

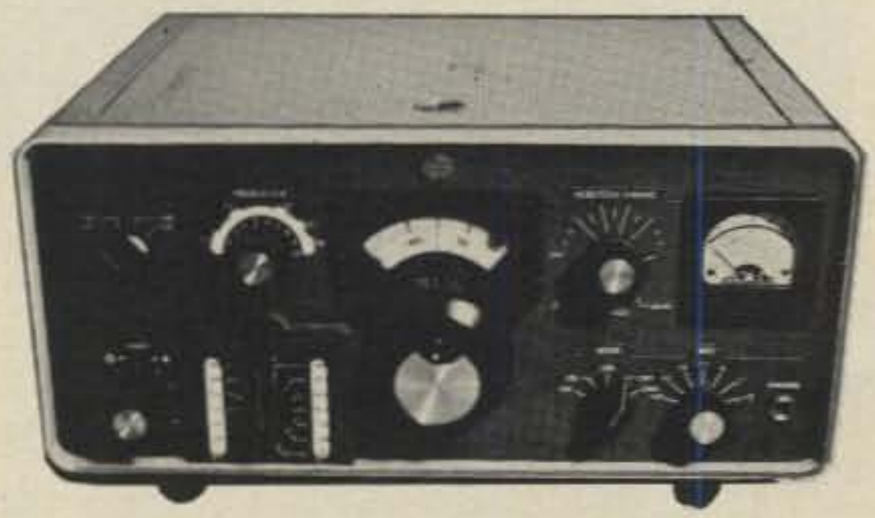
USED GEAR • TRADE UP • FREE UPS SHIPPING ON PREPAID ORDERS

$2,000,000 HAM INVENTORY

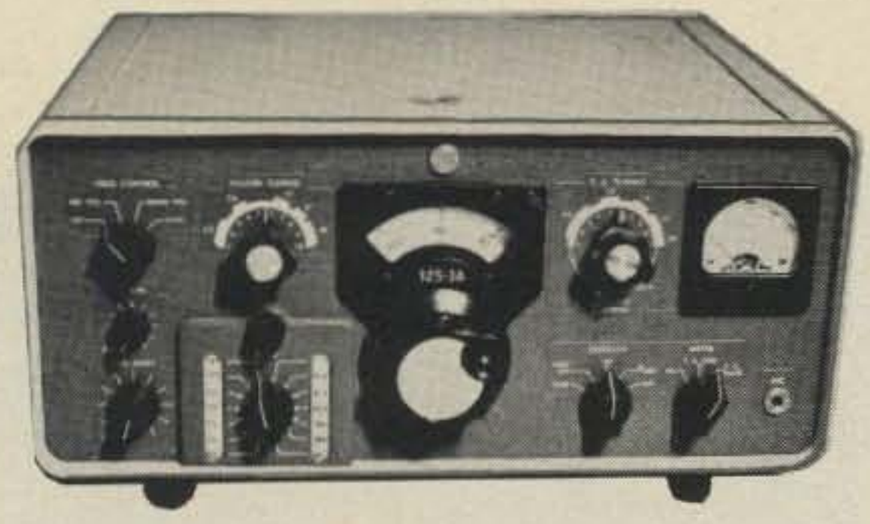
THE LOWEST POSSIBLE PRICES

COLLINS AMATEUR EQUIPMENT

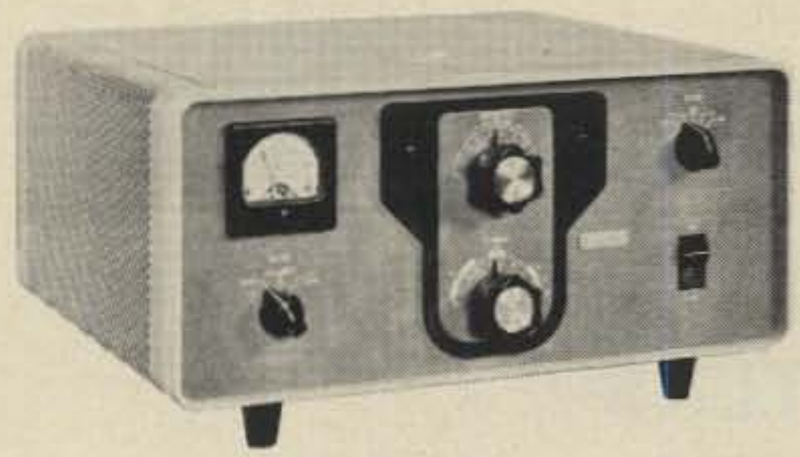
KWM-2A TRANSCEIVER **$3533.00**
Unmatched for mobile and fixed station applications. 175W on SSB, 160W on CW. Switch select up to 14 optional Xtals. Can be used for RTTY. Filter type SSB generation. Automatic load control. Inverse RF feedback. Reimeability-tuned variable oscillator.



75S-3C RECEIVER **$2504.00**
Sharp selectivity. SSB, CW and RTTY. Single control rejection tuning. Variable BFO. Optional mechanical filters for CW, RTTY and AM. 2.1 KHz mechanical filter. Zener regulated oscillators. 3-position AGC.

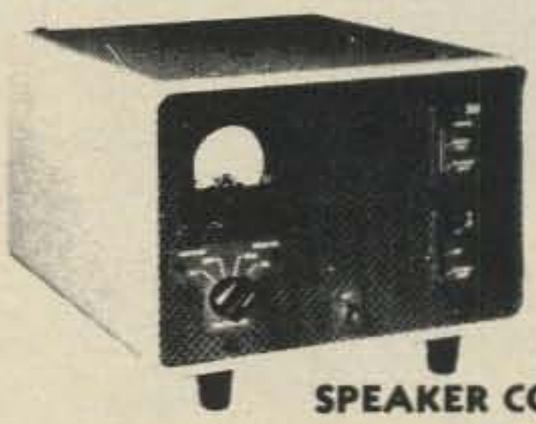


32S-3A TRANSMITTER **$2597.00**
Covers all ham bands between 3.4 MHz and 30 MHz. Nominal output of 100W. 175W, SSB and 160W CW. Dual conversion. Automatic load control. RF inverse feedback. CW spotting control. Collins mechanical filter.



30L-1 LINEAR AMPLIFIER **$1536.00**
1000 watts PEP on SSB and 1000 Average on CW. Single control rejection tuning (50 dB). Variable BFO. 2.1 kHz Mechanical filter. Zener regulated oscillators. 3 position AGC. Exclusive comparator circuit.

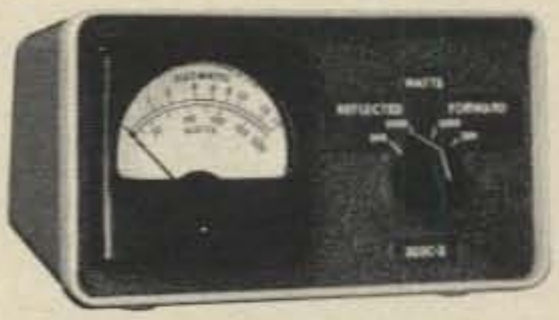
312B-3 SPEAKER
$80.00



312B-4
SPEAKER CONSOLE
$546.00

312B-5 VFO CONSOLE
$1212.00

516F-2 AC POWER SUPPLY
$440.00



302C-3 DIRECTIONAL WATT METER
$360.00

DL-1 DUMMY LOAD
$270.00

MASTERCHARGE & BANKAMERICARD ACCEPTED

THE BIG 'H' FOR ALL YOUR HAM NEEDS!

HAMTRONICS

DIVISION OF TREVOSE ELECTRONICS
4033 Brownsville Rd • Trevose, Pa. 19047
(215) 357-1400/(215) 757-5300

WE HAVE WHAT YOU NEED AT...

HAMTRONICS-WHERE THE HAM IS KING

TEMPO

TEMPO ONE	HF Transceiver. 80-10M. USB, CW & AM	399.00
AC/ONE	Power Supply for TEMPO ONE	99.00
VF/ONE	External VFO for TEMPO ONE	109.00
TEMPO VHF/ONE	Transceiver. 2M. 144 yo 148 MHz. PLL	399.00
TEMPO SSB/ONE	SSB Adapter for TEMPO VHF/ONE	199.00
TEMPO 2020	Transceiver. 80-10M. USB, LSB, CW and AM. PLL. Digital	759.00
FMH	2W, VHF/FM, 6 Ch. Hand Held. 144-148 MHz	199.00
RBF-1	Wattmeter & SWR Bridge	42.95
DM-20	Desk Mike. 600 or 50K ohm. PTT & Lock Switches	39.00
MS-2	4 Ch. Pocket Scanning Rcvr.	99.00

ATLAS

210X	Transceiver. 10-80M. 200W	679.00
215X	Transceiver. 15-160M. 200W	679.00
OMK	Deluxe Mtg. Kit for 210X & 215X	48.00
220CS	AC Console for 210X & 215X	149.00
350-XL	Transceiver. SSB. Solid State. 10-160M. 350W.	995.00
DD6-XL	Digital Dial Readout for 350-XL	195.00
305	Plug-In Auxiliary VFO. For 350-XL	155.00
311	Plug-In Auxiliary Crystal Oscillator for 350-XL	135.00
350-PS	AC Pwr Supply w/Spkr & Phone Jack for 350-XL	195.00
DMK-XL	Mobile Mounting Bracket for 350-XL. Easy Plug-In	65.00

SWAN

700 CX	Transceiver. 700W PEP. SSB. 80-10M. USB, LSB or CW	649.95
VX-2	Plug-In VOX for 700 CX	44.95
SS-16B	Super Selective IF Filter for 700 CX	99.95
MARK II	Linear Amplifiere Full Legal Power. W/100W input. 80-10 M.	849.95
1200 X	Portable Linear Amplifier. 1200W PEP. SSB. 700W, Ch. 300W, AM. 80-10M.	349.95
FP-1	Hybrid Telephone Patch. Connect Rcvr/Xmitter to Phone lines	64.95

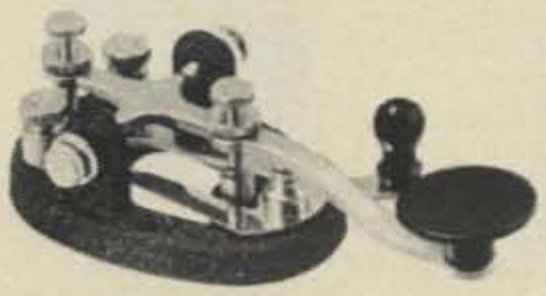
FC-76	Frequency Counter. 5 Digit LED	169.95
WM6200	In-Line Presicion Wattmater for 2M. 2 Scales to 200W. Reads SWR.	59.95
FS-2	SWR & Field Strength Meter	15.95
SWR-3	Pocket SWR Meter	12.95
SWR-1A	Relative Power Meter & SWR Bridge	25.95
W2000	In-Line Wattmeter. 3 Scales to 2000W. 3.5 to 30 MHz	59.95
WM-3000	Peak/RMS Wattmeter. Tells The Truth About SSB	79.95
FS-1	Pocket Field Strength Meter	10.95
WM1500	In-Line Wattmeter. 4 Scales to 1500W. 2 to 50 MHz	74.95
MARK II	Linear Amplifier. Full Legal Power. W/100W input. 80-10 M.	849.95
1200 X	Portable Linear Amplifier. 1200W PEP. SSB. 700W, CW. 300W, AM. 80-10M.	349.95

USED GEAR • TRADE UP • FREE UPS SHIPPING ON PREPAID ORDERS

$2,000,000 HAM INVENTORY

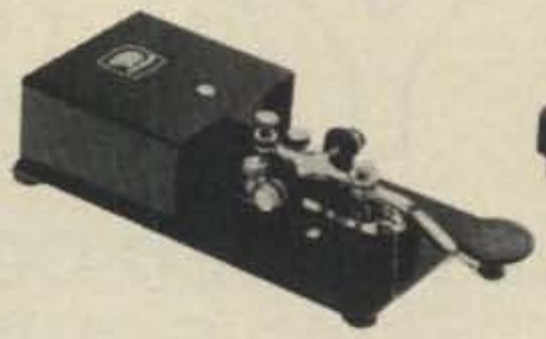
THE LOWEST POSSIBLE PRICES

NYE VIKING

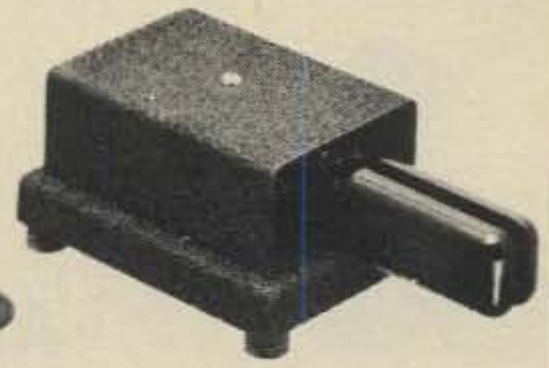


No. 114-310-003 $8.25

No. 114-310-004GP $50.00



No. 114-404-002 $18.50



No. SSK-1 $23.95

No. 250-46-1 $36.50

No. 250-46-3 $44.50

No. 250-20-1 $19.95

No. 250-0025-003 $212

NPC

2.5 AMP

12CB4 29.95

4 AMP

103R 39.95

6 AMP

104R 49.95

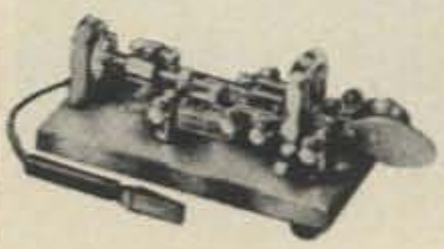
12 AMP

108 RM
99.95

25 AMP

109R 149.95

VIBROPLEX

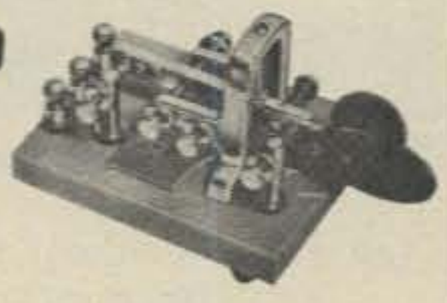


"PRESENTATION"
66.00

"ORIGINAL"
39.95

"LIGHTNING BUG"
39.95

"CHAMPION"
31.50



VIBRO-KEYER
33.00

THE BIG 'H' FOR ALL YOUR HAM NEEDS!

MASTERCHARGE & BANKAMERICARD ACCEPTED

HAMTRONICS

DIVISION OF TREVOSE ELECTRONICS
4033 Brownsville Rd • Trevose, Pa. 19047
(215) 357-1400/(215) 757-5300

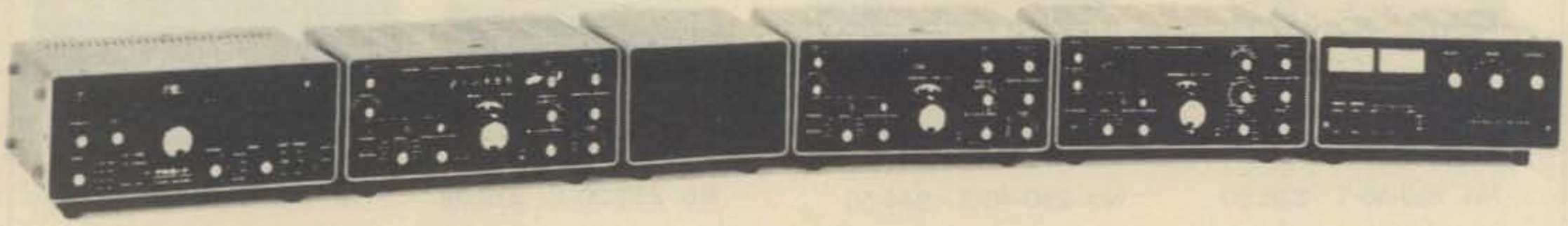
WE HAVE WHAT YOU NEED AT...

YAESU

ADVANCED COMMUNICATION EQUIPMENT

YD-844
Dynamic Mike

QTR-24
World Clock



Left to right – FRG-7, Solid State Synthesized Communications Receiver • FR-101 Digital, Solid State Receiver • SP-101B, Speaker • FR-101, Digital Solid State Receiver • FL-101, 100 W Transmitter • FL-2100B, 1200 W PEP Input Linear Amplifier

Left to right – FT-620B, 6 Meter Transceiver • YP-150, Dummy Load Wattmeter • YO-100, Monitor Scope • FTV-250, 2 Meter Transverter • FTV-650, 6 Meter Transverter • FV-101B, External VFO • FT-101E 160-10 M Transceiver

Left to right – YC-601, Digital Frequency Display • YC-355D, Frequency Counter • FP-301, AC Power Supply • FT-301S Digital, All Solid State Transceiver • FV-301, External VFO • FT-221, 144-148 All Solid State All Mode Transceiver

USED GEAR • TRADE UP • FREE UPS SHIPPING ON PREPAID ORDERS

$2,000,000 HAM INVENTORY

HAMTRONICS-WHERE THE HAM IS KING

THE LOWEST POSSIBLE PRICES

KENWOOD — THE PACESETTER IN AMATEUR RADIO

TS-700A **$599.00**

2M ALL MODE BASE/MOBILE TRANSCEIVER. SSB (upper and lower), FM, AM and CW. AC and DC. 4 MHz band coverage (144 to 148 MHz). Dial in receiver frequency and TS-700A automatically switches xmitter freq. 600 KHz for repeater operation. Xmit, Rcv capability on 44 Ch. with 11 xtals.

TR-7400A **$399.00**

2M MOBILE TRANSCEIVER. Synthesized PLL. Selectable output, 25 watts or 10 watts. 6 Digit LED freq. display. 144-148 MHz, 800 CH. in 5 KHz steps. 600 KHz repeater offset. Continuous tone-coded squelch (CTSC). Tone Burst.

TS-820 **$869.00**

SSB TRANSCEIVER. PLL RF Monitor Noise Blanker. Digital hold locks counter & display at any frequency, but allows VFO to tune normally. True RF compressor adjustable speech processor. IF shift control. RF attenuator. VOX, GAIN, ANTIVOX and VOX delay controls. RF negative feedback. Optional digital readout. DRS Dial. High stability FET VFO.

TS-520S **$649.00**

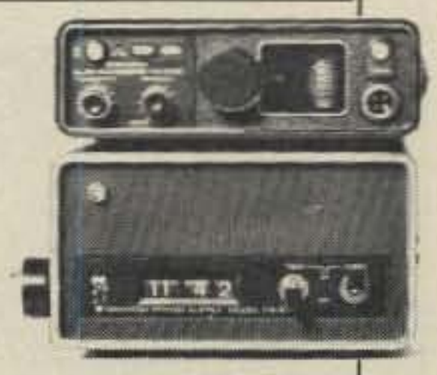
SSB TRANSCEIVER. Proven in the shacks of thousands of discriminating hams, field day sites, DX and contest stations and mobile installations. Superb engineering and styling.

SP-520 **$28.00**

Optional external speaker for better readability.

TV-502 **$249.00**

TRANSVERTER. Puts you on 2M the easy way. 144-145.7 MHz or optional 145-146 MHz.



Power Supply.
PS-5 $79.95

TR-7200A **$229.00**

2M MOBILE/BASE FM TRANSCEIVER. Ignition interference control. 2 pole Xtal filter in IF rcvr. Protection for final stage transistor & reverse polarity connections. Priority Ch. switch. Quick release mount. LED CH. indicators. Switchable 10W or 1W output.

MC-50 **$39.50**

Dynamic microphone designed expressly for amateur radio operation. Complete with PTT and LOCK switches, and a microphone plug. (600 or 50k ohm)

COMMUNICATIONS RECEIVER. 1.8 to 29.7 MHz, WWV and CB band. 50 MHz, 144 MHz converter optional. Stable VFO & oscillator for 5 fixed channels. 1 KHz dial readout. Xtal filters (SSB/8 pole, CW/8 pole, AM/6 pole). Squelch. S meter. Noise blanker.

S599D-$25.00 R599D-$499.00 T599D-$499.00

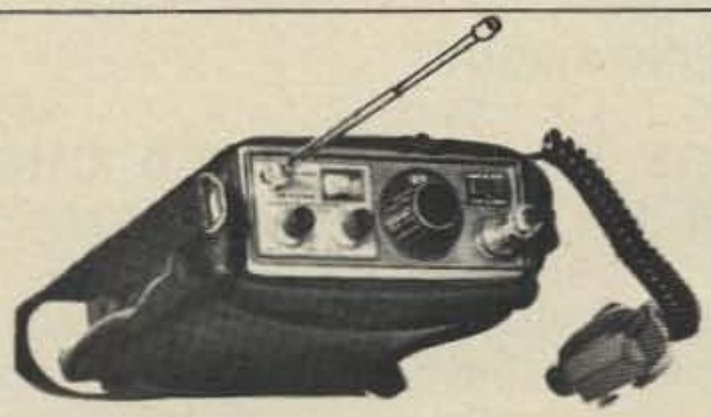
SSB TRANSMITTER. 3.5 to 29.7 MHz. Stable VFO. 1 KHz dial readout. 8 pole Xtal filter. AM Xmission available. Built-in AC pwr supply. Split frequency control available.

VFO-820 **$145.00**

Designed exclusively for use with TS-820. RIT circuit and control switch. Fully compatible with optional digital display.

VFO-520 **(Not Shown)** **$119.00**

Solid State Remote VFO. RIT circuit with LED indicator.



TR-2200A **$229.00**

PORTABLE 2M FM TRANSCEIVER. 12 Ch. capacity. Removable telescoping antenna. External 12 VDC or internal NI-CAD batteries. 146-148 MHz. 6 CH. supplied. Switchable 2W or 400mW output.

R-300 **$239.00**

ALL BAND COMMUNICATIONS RECEIVER. AC, batteries or external DC. 170 KHz to 30 MHz in 6 bands. Foreign broadcasts or ham radio in AM, SSB and CW. Dual gate MOS/FET transistors & double conversion. Band spread dial. 500 KHz marker.

MASTERCHARGE & BANKAMERICARD ACCEPTED

THE BIG 'H' FOR ALL YOUR HAM NEEDS!

HAMTRONICS

DIVISION OF TREVOSE ELECTRONICS
4033 Brownsville Rd • Trevose, Pa. 19047
(215) 357-1400/(215) 757-5300

THIS YEAR . . .

GET ON TOP WITH ALPHA

A GREAT OPERATING YEAR IS STARTING RIGHT NOW.
SUNSPOTS ARE UP — CONDITIONS SHOULD BE THE BEST IN YEARS.
THOUSANDS OF ENTHUSIASTIC NEW AMATEURS ARE ON THE BANDS.
HAMMING WILL BE TERRIFIC —
***BUT COMPETITION WILL BE* ROUGH!**

WHEN QRM RAGES AND THE PILE-UPS DEEPEN, WOULDN'T YOU LIKE TO HAVE. . .

- ALL THE ROCK-CRUSHING POWER YOUR LICENSE ALLOWS — on *all* modes — with no need to 'baby' your linear, no duty cycle or time limit at all?
- INSTANT BANDCHANGE 'NO-TUNE-UP' all the way from 10 through 80 meters, with the exclusive **ALPHA 374?**
- COVERAGE ALL THE WAY DOWN TO 160 METERS with the smooth-tuning, extra-rugged **ALPHA 76** powerhouse?
- CRISP, PENETRATING "TALK POWER" — as much as 10 dB extra to 'punch through' when the going gets really tough, with the **ALPHA/VOMAX** split band speech processor? It's as effective as the best rf processor, lower in distortion, and very easy to use with *any* rig!
- THE PROTECTION OF A FACTORY WARRANTY THAT RUNS A FULL 18 MONTHS — *six times as long* as competitive units? **[ETO tries to build every ALPHA to last forever . . . and we're making progress: not one single case of ALPHA 76, 77D, or 374 power transformer failure has ever been reported!]**
- THE PURE PLEASURE OF OWNING **ALPHA**?

ALPHA: SURE YOU CAN BUY A CHEAPER LINEAR — BUT IS THAT *REALLY* WHAT YOU WANT?

START ENJOYING **THE ALPHA EDGE** NOW. Call or visit your nearest **ALPHA/ETO** dealer, or ETO direct, right away, and you can have prompt delivery of your new **ALPHA** linear amplifier and **ALPHA/VOMAX** processor. While you're at it, ask for illustrated literature describing all **ALPHA** products in detail, as well as a copy of *"Everything You Always Wanted to Know About (Comparing) Linears . . . But Didn't Know Whom to Ask."*

ETO **EHRHORN TECHNOLOGICAL OPERATIONS, INC.**
BOX 708, CANON CITY, CO 81212 (303) 275-1613

Here are some simple ideas that can be easily done in a few evenings to increase the versatility of the Wilson H-T

Customizing /Accessorizing The Wilson H-T

BY KARL T. THURBER, JR.*, W8LYF

After owning a Wilson 2-meter handi-talkie, the 2.5-watt Model 1402SM, for over a year, I've come to the conclusion that the unit is one of the better values in 2-meter gear. However, after using the unit "barefoot and unmodified" for about a month, it became apparent that a number of convenience-type features could easily be added to the Wilson to significantly increase its versatility and operating flexibility.

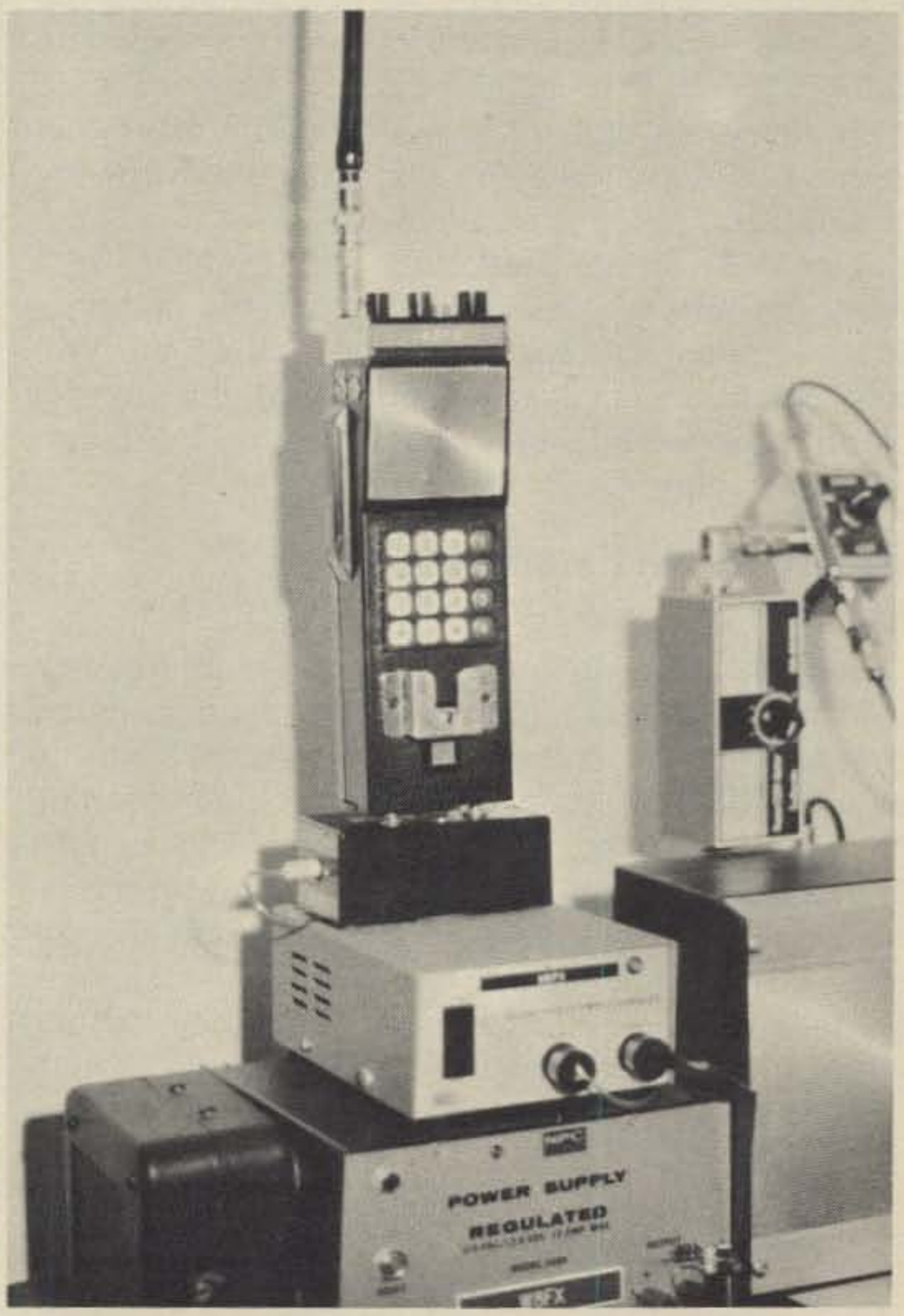
The areas needing some work were explored and the following list of desirable features was developed:

1. Addition of an external power jack.
2. Addition of a mobile power adapter.
3. Addition of an external speaker/headphone jack.
4. Design of an inexpensive charging base.
5. Addition of an easy-off belt clip.
6. Conversion of the r.f. output connector from type "F" to "BNC".
7. Construction of a screw-on ⅝-wave antenna for semi-portable use.
8. Incorporation of a touch-tone pad.
9. Addition of an external microphone.

CQ and several of the other amateur journals have run a number of articles which touch on various modifications to the Wilson, but most of these articles described only one or two of the features on my list. After looking over the literature, it was clear that I was on my own as far as "putting it together" was concerned. A few weeks' experimentation allowed incorporation of all nine features into the Wilson, significantly enhancing its overall versatility and operating convenience. These modifications are described below.

Addition Of An External Power Jack

The Wilson has no provision for power other than the internal battery pack. Addition of an external power jack is a simple matter, allowing fixed-station or mobile operation without running down the batteries. Simply mount a 3.5 MM miniature closed-circuit phone jack on the left side of the unit (looking from the front) just behind the speaker. The shell of the jack should be connected to the negative or "minus" side of the battery pack slide rail; the lead from the positive or "plus" side of the



The modified Wilson H-T shown on top of the charger base.

*372 Crabapple Drive, Wright-Patterson AFB, Ohio 45433

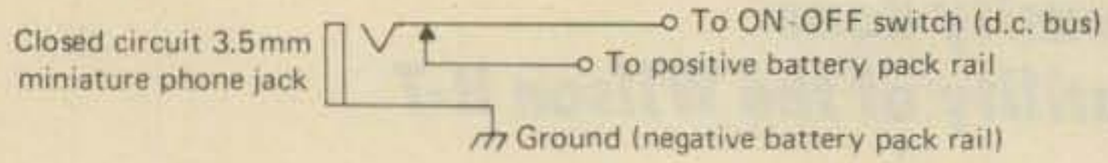


Fig. 1—External power jack.

battery pack rail should be connected to the "hot" side of the jack and the "hot" power lead to the circuit board so that the battery pack is normally connected and is disconnected only when a source of external power is connected through the jack. See fig 1.

Addition Of A Mobile Power Adapter

There is no point in running down the nicads in the Wilson when operating mobile—yet the H-T as supplied from the factory has no provision for d.c. power input.

Using a standard cigarette lighter plug, four feet of lamp cord, and a miniature 3.5 MM phone plug, the newly-installed external power jack can interconnect with the auto's d.c. electrical system for 12 v.d.c. operation.

To eliminate any possible alternator whine or other car electrical noise from entering the Wilson through the external power jack, a 3000 to 5000 mf, 16-20 v.d.c. capacitor should be bridged across the car's fuse block to ground where the cigarette lighter is fused. The capacitor should be connected on the lighter or "fused" side of the line to protect the car's wiring should the capacitor inadvertently short out.

Incidentally, there has been no problem with voltage spikes or "transients" from the automobile's electrical system damaging any of the Wilson's components. Just be sure that the correct polarity is observed when connecting up the cigarette lighter plug.

Addition Of An External Speaker/ Headphone Jack

Although audio is brought to the multi-function jack (normally for use in the Wilson "speaker mike" accessory), I've found it more convenient to bring out an audio tap to a separate jack for feeding either phones or an external speaker. This can be done simply by installing a second 3.5 MM miniature closed-circuit phone jack just behind the external power jack on the left side of the cabinet. The jack shell or "ground" is connected to one side of the speaker and the "hot" jack pin is connected to the audio output line feeding the internal speaker and to the speaker so as to have the internal speaker normally "on", and audio routed to the external speaker only when a plug is inserted in the jack. Incidentally, the low-impedance, lightweight Telex or Calrad "stethoscope" type earphone make excellent headsets. Also, the Wilson is capable of producing outstanding audio quality when connected to a good communications-type speaker for fixed-station or mobile work. See fig. 2.

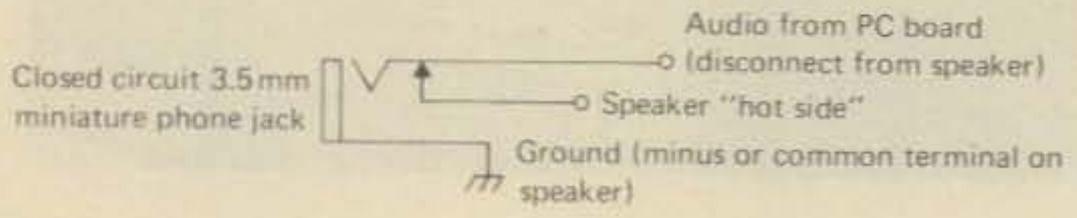


Fig. 2—External speaker/headphone jack.

Design Of An Inexpensive Charging Base

A simple approach to recharging the 12-volt battery pack (10 AA nicads) involves the purchase of a Radio Shack #21-516 or equivalent nicad charger (at *$5.95)* and a small (4 × 2⅛ × 1⅝) bakelite box (Radio Shack #270-239). Drill two small holes in the bakelite box to correspond to the spacing of the charging terminals on the Wilson; run two 6-32 screws through the holes so they will contact the charging terminals when the Wilson rests on the box. A small angle-bracket can be mounted on the box so as to "steady" the H-T as it rests on the charging box. To complete the installation, a chassis-mount type power connector to the charger plug can be mounted on the side of the bakelite box and wires run to the screws that will make contact with the Wilson charging terminals.

Rube Goldbergish? Not at all. The charger works as well as much more elaborate commercial units, and at a fraction of the cost. About 12-14 hours will fully charge the nicads. Just be sure that in connecting up the charger, polarity is observed and that each of the ten batteries in the battery pack are inserted for correct polarity. (Reversed polarity on the nicads generates excessive heat—first in the cells and then in the H-T case itself! I inadvertently reversed polarity for just a few minutes, managing to destroy five of the ten nicads and almost permanently sealing the plastic battery pack in the Wilson!) An extra battery tray can be obtained from Wilson for about $5 and a spare set of nicads for about $10 on the flea-market circuit. The spare set can be charged up and kept on reserve for extended portable operation away from a.c. power sources.

Easy-Off Belt Clip

Adding a spring belt clip or other belt-hooking gadget directly to the back of the Wilson interferes with getting the leatherette case on the unit. Another way is to mount the spring belt clip on the back of the leatherette case, either epoxying or screwing it on. I used a "spare" back off a Motorola H-T, and it works fine. If the external mike is to be carried around with the H-T, a standard mike clip (The type with securing screws at top and bottom) can be mounted on one side of the unit; or—if you can find

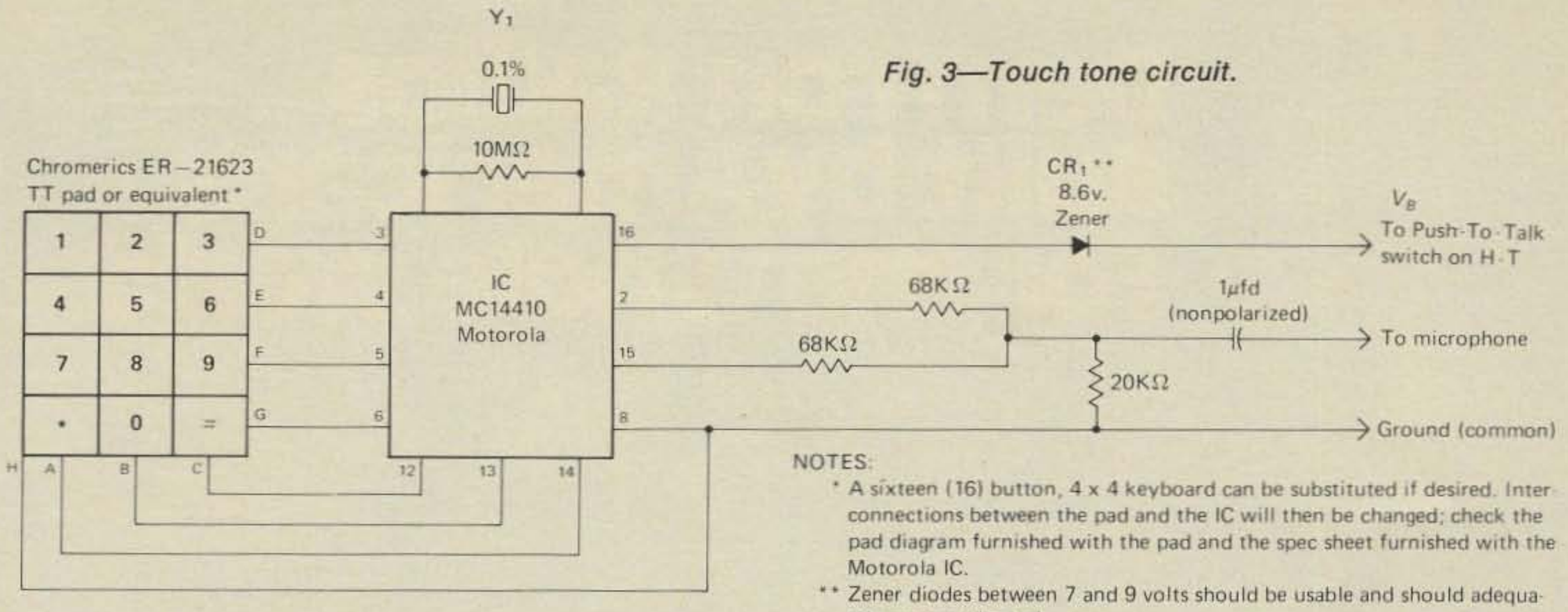


Fig. 3—Touch tone circuit.

NOTES:

* A sixteen (16) button, 4 x 4 keyboard can be substituted if desired. Interconnections between the pad and the IC will then be changed; check the pad diagram furnished with the pad and the spec sheet furnished with the Motorola IC.

** Zener diodes between 7 and 9 volts should be usable and should adequately protect the pad.

one at a local flea-market—a police-type belt clip mike holder can be used (These have a small mike holder built in to a leather "sleeve" which goes around the belt).

R.F. Output Connector Conversion

As supplied by the factory, the Wilson is equipped with TV-type "F"-connectors. While the fitting on the Wilson is perfectly sturdy, the line fittings are not the sturdiest of connectors, nor are they particularly easy to work with. For these reasons, many Wilson owners have removed the F-type connector and substituted a BNC-type chassis connector. Although this "solves the problem," it is a difficult task to accomplish and means practically disassembling the H-T to get at the connector, and once done, a new rubber ducky with BNC connectors would have to be purchased to mate with the new BNC chassis connector. Instead, I made up an external "BNC-To-F" adaptor from junkbox parts, i.e., a BNC chassis connector and male F-type connector soldered together did the trick; a commercially-made BNC-To-F adaptor is now available but rather expensive. Once the adaptor is constructed, BNC-type fittings can be used in the coax antenna lead or a second in-line BNC-To-UHF (PL-259) connector can be used.

For mobile work, I use BNC-To-RCA phòno plug adaptors as I run the Wilson into a Heath HA-201 10-watt amplifier which uses RCA fittings and which I have permanently mounted under the dash for quick plug-in to the Wilson.

Semi-Portable 5/8-Wave Antenna

For those situations where a long antenna can be tolerated—such as when the H-T is used from one semi-fixed location for a period of time—a ¼ wave or, better yet, full 5/8 wave whip will run rings around the "rubber ducky" furnished with the H-T. An inexpensive 5/8 wave antenna can be made from a 47½" stainless steel rod—of the kind usually sold at hamfests and surplus outlets for $1 or so—inserted into a "BNC" type connector and epoxied into place. An "F" type connector won't support the whip, so the adaptor described above can be used to convert the BNC fitting on the whip to the F-type on the Wilson. Of course, if a full 5/8 wave whip is a bit ungainly, a ¼ wave works out to 19".

Tone-Tone Pad

One of the best features of 2 meter f.m. operation is the autopatch capability of a growing number of repeaters, and certainly a worthwhile one.

Installing a touch-tone on the Wilson is about a $30 investment, involving a touch-tone pad (Chomerics ER-21623 or equivalent), Motorola MC14410 IC chip, 1 MHz crystal and a few other parts. Also becoming available are "all-in-one" TT Modules which have both the pad and the electronics mounted in one unit; these certainly can be used, being epoxied to the front of the Wilson. However, these units are generally very thick, and as such would protrude from the face of the unit. The circuit I used is shown in fig. 3 and is fairly standard. Due to the cramped quarters inside the H-T, I decided not to mount the components on a PC board (which takes up space) but to build the circuit around the 16-pin IC socket—the underside of the socket has a small "trough" into which most of the components can be formed. After completion, the IC socket can be epoxied to the back of the squelch control, and leads for +12 v.d.c., audio, and ground (common) are brought out for connection to the appropriate circuit points on the Wilson as indicated in fig. 3. The touch-tone pad itself is, of course, mounted on the front of the case midway between mike and speaker by drilling holes in the case to allow the pad mounting terminals to pass

(Continued on page 96)

DenTron Radios... Built by Americans for the whole world.

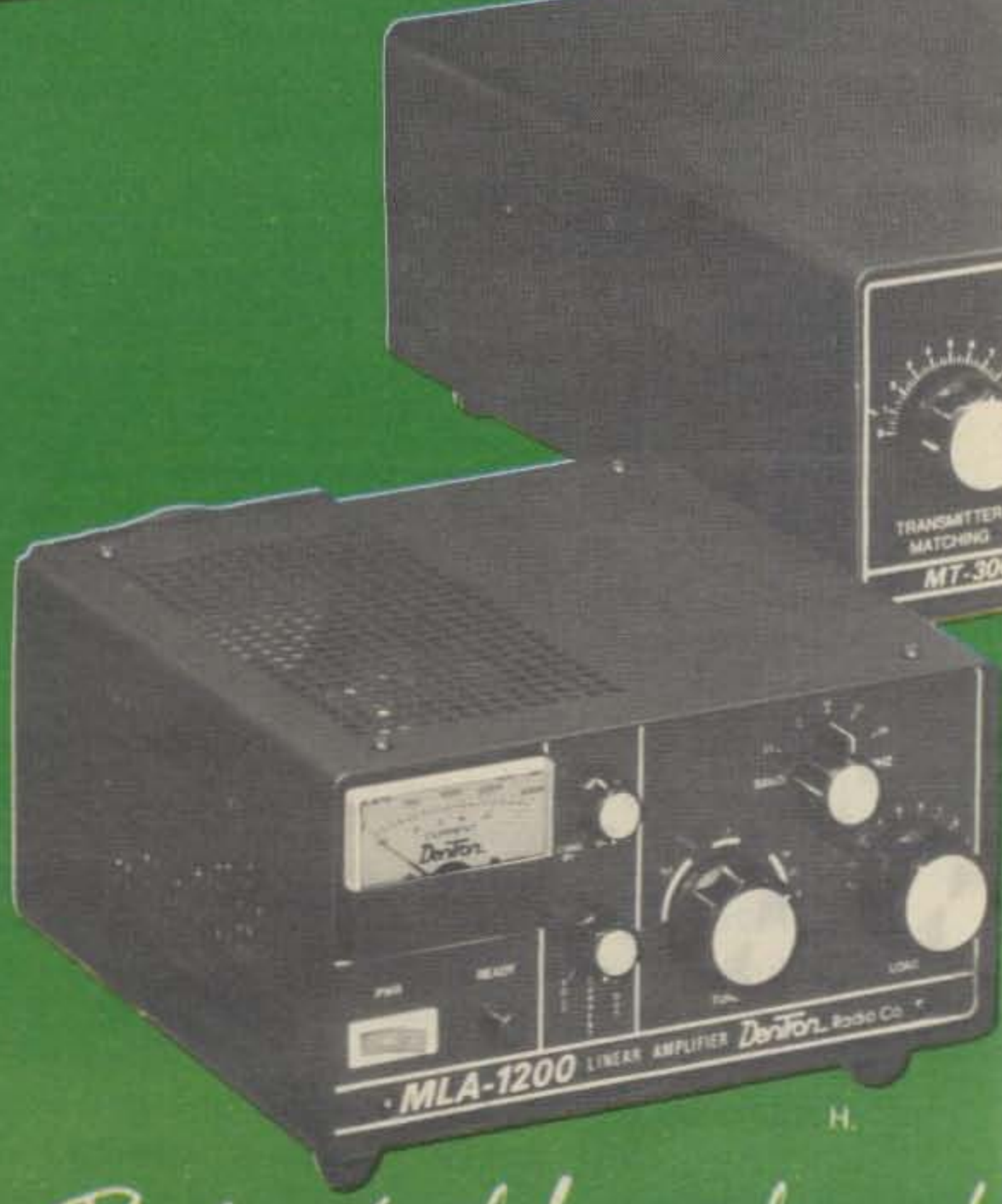
One of the greatest pleasures ham radio brings is contact with distant lands. What other organization can boast of daily communication among its members throughout the world?

It's a great hobby and we want to make it more fun for you!

DenTron antenna tuners do just that. Our Super Tuners are the only tuners on the market capable of matching everything between 160 and 10 meters, plus handling 1-3 KW PEP.

G.

F.



H.

Professional hams depend o

A. **The Original Super Tuner 1KW PEP $129.50.** If you're new at ham radio you'll find it's invaluable.

B. **Super Super Tuner 3KW $229.50.** If you've added more power to your station it's a must. Both the Super Tuner and the Super Super Tuner match balanced feed, coax, random or long wire. Both transfer maximum power from the transmitter to the antenna.

C. **NEW! The MT-3000A $349.50.** The MT-3000A was designed for the serious ham interested in professionalizing his station. It is a rugged antenna tuner that easily handles 3KW PEP. It has built-in dual watt meters, and a built-in dummy load. The antenna selector switch: (a) enables you to by-pass the tuner direct; (b) select the dummy load or 5 other antenna systems.

D. **80-10 Wire Tuner $59.50.** Our random wire tuner handles 500 watts and is ideal for the ham on the move.

E. **W-2 Watt meter $99.50.** DenTron's dual in-line Wattmeter allows you to read forward and reflected watts simultaneously.

F. **SuperAmp $574.50.** The SuperAmp is one of the best amplifier values currently on the market. It covers 160-10 meters, and features four 572B triodes in grounded grid. With it add 2000 watts PEP SSB and 1KW CW power. No other amplifier delivers so much at such a reasonable price.

G. **NEW! MLA-2500 $799.50.** The MLA-2500 is one of the world's finest high performance military amateur amplifiers. It was designed for the discriminating buyer who knows and appreciates precision plus power. Coast along with a full 2000 watts PEP input on SSB, 1000 watts DC input on CW, RTTY, or SSTV. The heart of the MLA-2500 is a heavy duty, self contained power supply, and it features 2 Eimac 8875's.

H. **NEW! MLA-1200 $399.50,** external AC supply, **$159.50**, DC supply **$199.50**. The MLA-1200 shares many fine features with its famous big brother, the MLA-2500, but also has a few distinctive features of its own. It employs a single Eimac 8875, running 1200 watts PEP or 1KW DC. It incorporates the same built-in ALC as the 2500. The MLA-1200 is the smallest 1200 watt linear amplifier on the market, great for your mobile home, boat or car!

DenTron for Amateur fun!

DenTron
Radio Co., Inc.

2100 Enterprise Parkway
Twinsburg, Ohio 44087
Phone (216) 425-3173

arma
amateur radio manufacturer's association

Tired of being Ripped Off?

Kindly stand by for a message from the Boss!

We mean the tough lookin' gent on the left. He's Big John Capone, top cat at the CW mob in Denver. Dat's the outfit what's causin' so much havoc wit the other ham retail entrepranoors.

Seems like some stoolie squealed about Big John's great soivice and stoopendus deals, and the woids out dat CW is de place to shop for amatoor goodies. Little tings like dem.

Now, ya got to get da picher strat see. The other fella on the right, he's John's lootenant, name of Allen Da Ape. He told John dat he woodn't stan for no foolishness from the gang wit customers. Dose guys at CW treat evry guy what comes trough the door like he's the man, see. Dat means real soivice and great poisanal treatment. When you hambones come to visit at CW, you know you've been there. Even if you don't buy nuttin. Cause we aim to make ya feel like CW's your home on the road. Sooner or later, like dat Cigar guy on TV says, we're gonna getja.

So when you're reddy to make dat next big plunge give ol' John or Allen a call. Tell 'em what ya need and make dem an offer they can't turn down. Big John's such a softy he'll probably go even better.

CW. The Capone mob what makes Hams happy.

CW ELECTRONIC SALES COMPANY
1401 Blake Street Denver, Colorado 80202 (303) 893-5525

BASIC RADIO

BY IRVING TEPPER*

Chapter 4: Shop Techniques

TYPES OF WIRE

Until recently all electronic equipment was assembled using hand-wiring techniques, with each component individually wired in and interconnected. Today much of that wiring is done automatically and more simply by printed circuit methods. There is still a great deal of interconnection using wires so we must know certain basic facts about the various types. Copper is the material used for chassis wiring; the copper is tinned, that is, given a coating of a combination of lead and tin, to prevent the copper from oxidizing (turning black). The oxide layer on the copper acts as an insulator to prevent electron flow and so must be removed. More on this is given in the section entitled "The Art of Soldering."

Two types of wire are used, bare and insulated. Bare wire is used for short connections (called "jumpers") and for connections to a chassis. A chassis is the metal frame on which the electronic unit is constructed.

Insulated wires are used when it is necessary to prevent wires from shorting to each other. The insulating materials vary, depending on the purpose for which the wire is to be used.

Plastic—Plastic insulation is almost universal for wire used to connect electronic circuits. The materials most commonly used are vinyl, PVC and Teflon. The insulation is removed from the wire using special wire strippers or a pair of diagonal cutters.

Enamel—An enamel coating over the copper wire provides a very thin layer of insulation that can be very effective. The types of enamel are identified by specific trade names such as Solvat or Formvar. The advantage of enamel wire is that while it is insulated the total diameter has not been greatly increased. Thus many turns of wire can be placed in a small space. This helps reduce the size of certain electronic devices such as transformers.

Enamel insulation should be removed by the use of an abrasive (fine sandpaper or steelwool). If a knife is used to scrape off the enamel care must be taken not to nick the wire as this will weaken it and could cause it to break.

Stranded Wire—The wire used to assemble a circuit is called hook-up wire. This wire, usually insulated,

Wire Gauge (AWG)	Diam. in Mils	Circular Mil Area	Current Handling Capacity
2	257.6	66,370	94.8
4	204.3	41,740	59.6
6	162.0	26,250	37.5
8	128.5	16,510	23.6
10	101.9	10,380	14.8
12	80.81	6,530	9.33
14	64.08	4,107	5.87
16	50.82	2,583	3.69
18	40.30	1,624	2.32
20	31.96	1,022	1.46
22	25.35	624.4	.918
24	20.10	404.0	.577
26	15.94	254.1	.363
28	12.64	159.8	.228
30	10.03	100.5	.144
32	7.950	63.21	.090
34	6.305	39.75	.057
36	5.000	25.00	.036
38	3.965	15.72	.022
40	3.145	9.88	.014

Chart I—American Wire Gauge sizes and data for copper wire. The diameter is given in mils and 1 mil equals 1/1000 of an inch. The listings for the current handling capacity is in Amperes.

*19 Woodland Road, Valley Stream, NY 11581

must be rigid enough to hold its shape and position and heavy enough to carry the necessary electron flow (measured in amperes). There are, however, some applications where the wire must be flexible rather than rigid; line cords or earphone leads are typical examples. For these applications *stranded* wire is used.

Stranded wire consists of many individual strands of wire twisted together to form a single conductor. While the individual strands are not insulated from each other the whole wire is insulated.

Litz Wire—For some special applications the individual strands of a stranded wire are insulated from each other with an enamel coating and the strands are twisted and bound together with a thin layer or two of cotton or silk thread. This type of wire, called *Litz Wire*, is used only for winding special types of coils.

To make an electrical connection to Litz Wire it is necessary to remove the cotton or silk, clean the enamel from each strand and retwist the strands.

Wire Sizes—The size of a wire is measured by its diameter. The larger the diameter, the greater the current carrying capability. Wire sizes are rated from #1 to #40 AWG (American Wire Gauge). Chart I lists the diameter, cross sectional area (in circular mils) and the maximum current capability (in amperes) of wire sizes 2 to 40. Odd-numbered wires, although used commercially, are not commonly available for purchase by an individual. Thus only the available even-numbered sizes are listed.

WIRE STRIPPERS, SOLDERING IRONS AND SOLDER

Wire Strippers—This tool is used to remove insulation from a wire without cutting or nicking the inner copper conductor. Typical wire strippers are shown in Fig. 1. These types of strippers can be adjusted for several sizes of wire. If you are working with 18 gauge wire, you set the cutter adjustment for 18 gauge, place it over the insulation at the point you wish to remove it, squeeze and push the unwanted part off the wire. The cutting blades will slice through the insulation but stop before reaching the wire. In addition to stripping wire, the portion of the cutter that is not notched can be used to cut wire.

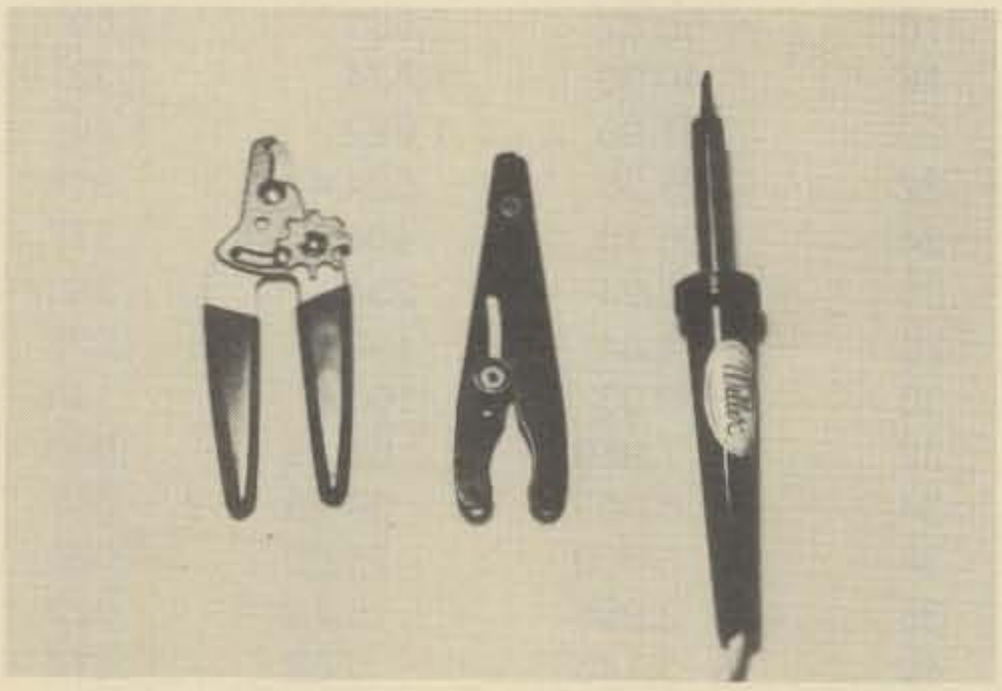


Fig. 1—Wire strippers (left). Wire stripper blades cut through insulation but not the wire. (Right) Standard type of soldering iron. A wire stand is used to rest the hot iron when it is not in use.

Soldering Irons—Almost all soldering irons used in electronics are electrically operated. A typical soldering iron shown in Fig. 1 has a wooden or composition handle, a metal shaft that contains the heating element and a copper tip that fits into the heating element. Extending out of the rear of the handle is the line cord that plugs into the power line to obtain the 117 volts to power the heating element.

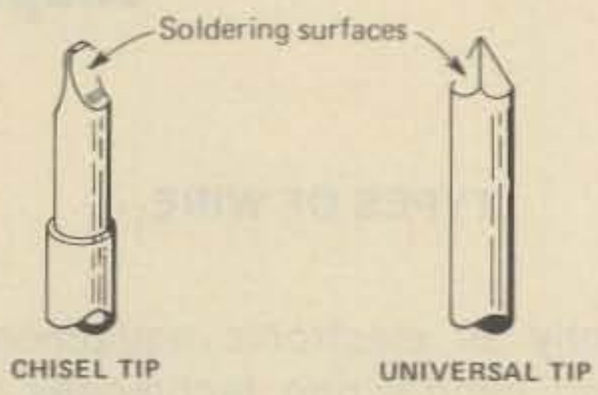


Fig. 2—Two shapes of tips most commonly used for soldering irons.

Soldering irons vary in size, shape and the amount of heat they can produce. The heat capability of an iron is measured in watts. Although available from 20 watts or less up to 700 watts, for general electronics work and the experiments given here a 30 to 50 watt iron will do nicely.

The tip of the soldering iron is of the utmost importance. Made of copper rod it either threads into the barrel or is held in place by a set screw. The tip of the soldering iron usually has one of two shapes, the universal or chisel tip. (See Fig. 2).

When the line cord is plugged into the outlet the electron flow through the heating element will heat the copper tip to operating temperature in about 8 to 15 minutes. There is no on-off switch for an iron; to shut it off it must be unplugged.

Types of Soldering Irons—In addition to the basic soldering iron shown in Fig. 1, there is a type with a pistol handle which some technicians feel offers easier handling.

One company manufactures a custom assembled iron. The handle has a lamp-type socket at one end and you can screw in a 27-watt, 42-watt or 50-watt heating element. There are also several different tips that can be screwed into the heating element.

Some companies manufacture "cordless" irons; they are battery operated and recharge on their stands when not in use. These types of soldering irons can provide enough power to solder as many as 100 connections before needing a recharge.

The soldering gun, shown in Fig. 3 heats instantly when the trigger is squeezed. The tip will reach

operating temperature in 4 or 5 seconds and cool as quickly when the trigger is released. Some guns have two trigger positions to provide two levels of heat, 100 or 140 watts. In addition most of the guns have a small built-in spotlight that is focused on the work area.

Fig. 3—Soldering gun is trigger operated and usually has a built-in spotlight. The tips can be replaced as they wear out.

LAMPS, LAMP SOCKETS, TERMINAL STRIPS

Lamps—A great variety of lamps are used in electronics as indicators: On-Off lamps, Receive function; Transmit function; Standby function and so on. Some of these lamps are of the incandescent type explained before. Others are neon lights or LEDs (light emitting diodes) and will be discussed later.

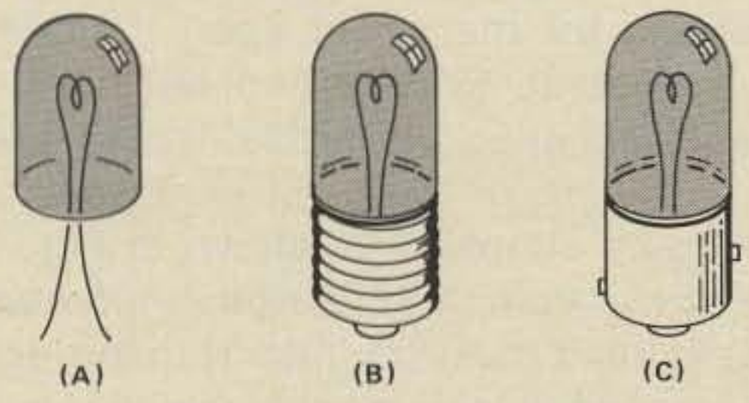


Fig. 4 (A)—Wire lead lamp (B) Screw base lamp (C) Bayonet base lamp.

The incandescent lamps have one of three common methods of connection: Wires (Fig. 4A); Screw base (Fig. 4B); Bayonet base (Fig. 4C). The screw base comes in three diameters: subminiature; miniature and candelabra.

Each lamp has a specific voltage rating; if a lower voltage is applied the lamp will not glow as brightly as it should. If a higher voltage than the rated value is applied, the lamp may burn out. When the correct voltage is applied to the lamp it will draw a specific amount of current from the source.

To be able to distinguish one lamp from another they are numbered for identification. Typical available incandescent lamps are listed in Chart II.

Lamp Sockets—Two typical lamp sockets are shown in Fig. 5. These types of assemblies are available for either screw or bayonet base bulbs and are made to mount on a panel. How this is done is shown in Fig. 5(A).

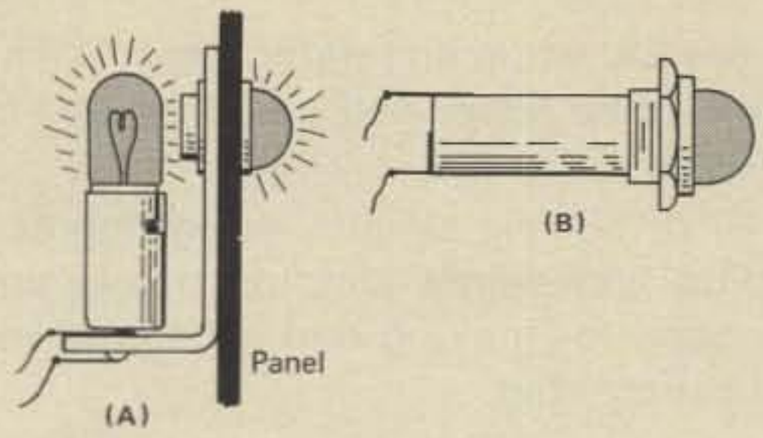


Fig. 5 (A)—Cross section of lamp assembly mounted on a panel. (B) Sealed type of panel lamp mount.

Volts	mA	Type	Base Style
1.5	25	—	Leads
2.0	60	49	Bayonet
2.0	60	48	Threaded
2.25	250	222*	Flange
2.33	270	PR-4	Flange
2.38	500	PR-2	Flange
2.47	300	14	Threaded
2.5	500	41	Threaded
3.2	350	45	Bayonet
3.57	500	PR-3	Flange
5.95	500	PR-12	Flange
6.0	25	—	Leads
6.0	100	T-1¾	Threaded
6.3	150	44	Bayonet
6.3	150	47	Bayonet
6.3	150	1847	Bayonet
6.3	150	40	Threaded
6.3	250	46	Threaded
7.0	410	55	Bayonet
7.5	220	51	Bayonet
7.5	220	50	Threaded
12.0	15CP	93†	Bayonet
12.0	25	—	Leads
12.0	75	T-1¾	Threaded
14.0	230	1891	Bayonet
14.0	200	1815	Bayonet
14.0	200	1487	Threaded
14.4	120	53	Bayonet
28.0	40	1819	Bayonet
28.0	170	1821	Threaded

*Pre-Focus Penlight Type †"Hi-Intensity"

Chart II—Partial listing of incandescent lamps used in electronics work.

Terminal Strips—A *terminal strip* consists of several metal lugs mounted along a fibre insulating strip. As shown in Fig. 6(A) each lug on the terminal strip is separated and insulated from the others and each

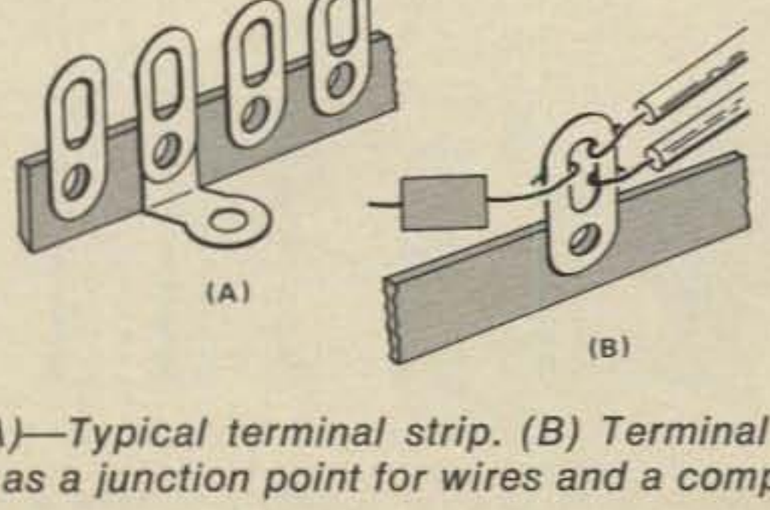


Fig. 6(A)—Typical terminal strip. (B) Terminal strip lug used as a junction point for wires and a component.

can hold several wires and parts leads. Each cluster of leads would be supported and insulated from the other clusters.

Terminal strips help simplify the wiring of circuits by providing convenient junction points and eliminate the need for making mid-air solder junctions that are unsupported.

HAND TOOLS—WRENCHES

Socket Wrenches, shown in Fig. 7, also called nut drivers, are used to tighten or loosen nuts that are threaded onto screws. The sizes most usually encountered in electronics work are 3/16", 1/4", 5/16", 11/32", 3/8" and 7/16". The size of a nut driver is usually stamped on the shaft, or sometimes on the handle, in units of 1/32". For example, a #6 nut driver indicates 6/32" or 3/16". A 1/4" nut driver would have a #8 on the shaft indicating 8/32".

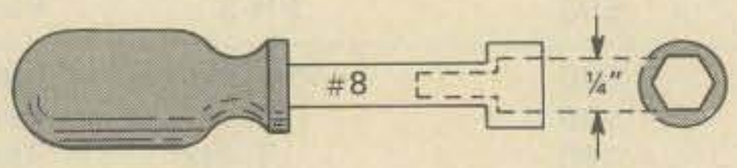


Fig. 7—Typical socket wrench. Size #8 stamped on the shank indicates 1/4" size.

Some socket wrench sets (Fig. 8) are made with a single handle and the various size sockets plug into the handle. Some sets include plug-in screw drivers as well and are used for field kits because they are smaller and lighter than an equal amount of separate tools.

Open End and Box Wrenches are for heavier work and will not be used often by the electronics technician except in the smaller sizes. They are necessary for such work as antenna and mobile equipment installation. Fig. 9 shows a typical set of wrenches; the closed ends are the "box" wrenches.

Allen Wrenches are used for screws that have no heads because these screws must recess below a surface. See Fig. 10. If the headless screw is slotted there is a possibility of the head snapping off. The recessed screw has a hexagonal hole in its center as shown in Fig. 10 and in order to loosen or tighten such screw a matching hexagon Allen wrench is inserted into the hole. Allen wrenches are made as small as 0.03" and up to as large as 1" (measured as shown in Fig. 10) but for electronics work we rarely find sizes larger than 1/4".

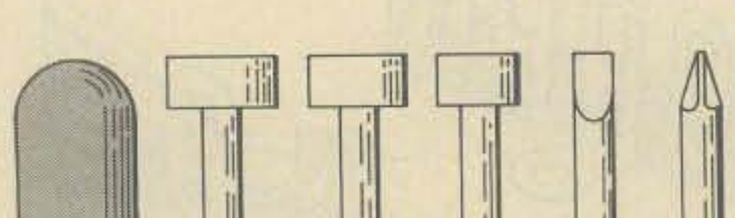


Fig. 8—Handle with special socket can take a series of socket wrenches and screwdrivers.

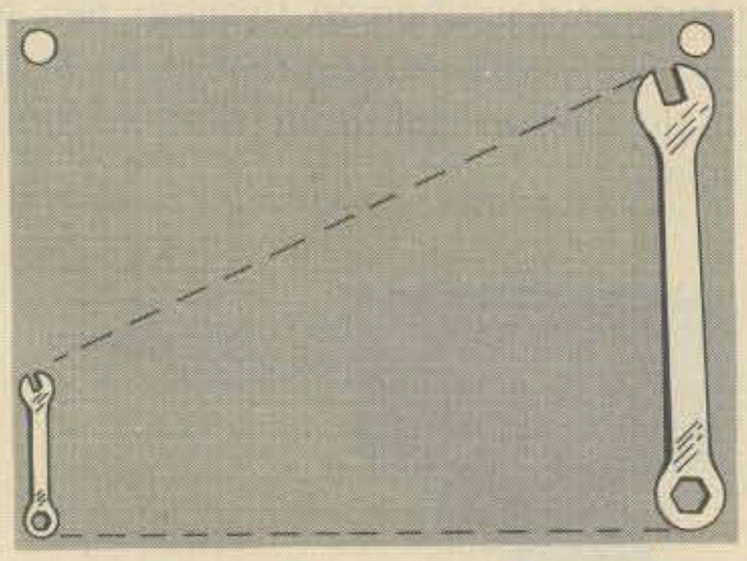


Fig. 9—Set of combination box and open end wrenches.

ELECTRONICS HARDWARE

Many fasteners and supports are used in the assembly of electronic equipment. This material is generally grouped under the heading of "hardware" and every technician must be familiar with the items listed below and the methods used to designate size.

Screws and Bolts—These are fastening devices which depend for their hold upon threads spirally cut into the metal. Screws and bolts will vary by head shape, material, body size, length and thread pitch.

Typical head shapes are shown in Fig. 11. They are, as shown from left to right, *flat head:* used when screw head must be flush with surface; *round head:* most commonly used, usually on flat surfaces; *oval head:* combination of first two shapes. The only reason for use is appearance. *Fillister head:* used for added strength. *Binding head screw:* used mostly for terminal strips to provide greater contact area for wires. *Set screws:* small screws with no protruding head used mostly as locking devices. This type of set screw requires the use of the Allen wrench described earlier. *Hexagonal head:* Fastened with a socket wrench. Permits greater tension on head for tightening or loosening the screw. The wrench will hold tightly while a screw driver may slip.

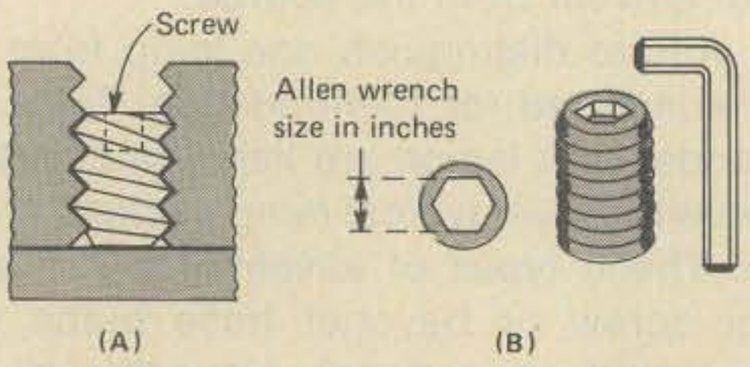
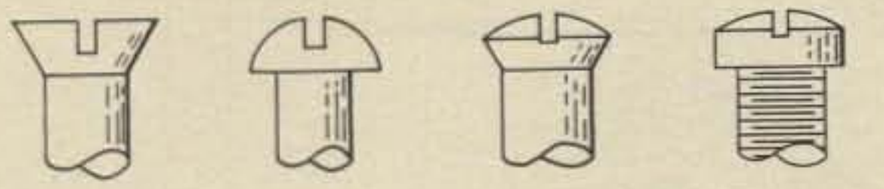


Fig. 10 (A)—Recessed set screw. (B) Recessed set screw designed for Allen wrench.



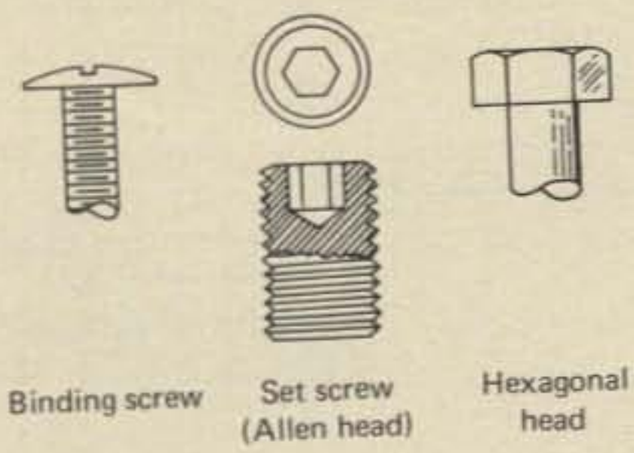


Fig. II—Types of screw heads.

Materials—The materials that may be used are soft iron, steel or brass. Which one is used depends upon the strength or finish requirement. When the screw is part of the electrical circuit, brass is used. When strength is needed, steel is used, frequently plated to prevent rusting.

The types of screws are shown in Fig. 12. The machine screw is the most widely used type in electronics work. The body is straight and threaded the entire length. The machine screw is defined by its length (see Fig. 12), body diameter and the number of threads per inch. A 1" 6-32 screw is 1" long, has a #6 body thickness and runs 32 threads per inch. A partial listing of body size and pitch (threads per inch) is given for the most common screws used in electronics work (Chart III).

Bolt—The bolt is similar to the machine screw but generally applies to screw sizes ¼" and larger. Bolts are not usually threaded all the way up to the head and the head is usually hexagonal.

Self-Tapping Screws—These types have case hardened sharp threads so that they cut their own threads into aluminum or iron stock. The end of the screw is tapered so it can start cutting threads in a small pilot hole that must be drilled for it. The hole is made slightly smaller than the screw shaft. This screw does not require a nut as do the machine screws or bolts.

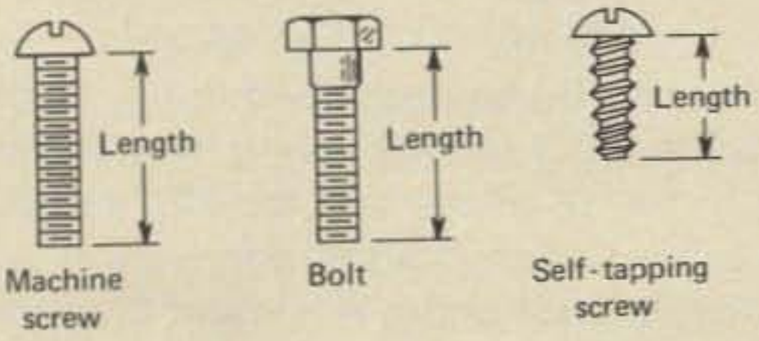


Fig. 12—Screw types.

Screw Body Size	Threads per inch	*Hole Needed to Pass Screw	Drill Bit Size #
2	56	89.0	43
4	40	113.0	33
6	32	140.0	28
8	32	169.5	18
10	32	193.5	10

*Hole diameter in mils, or thousandths of an inch.

CHART III

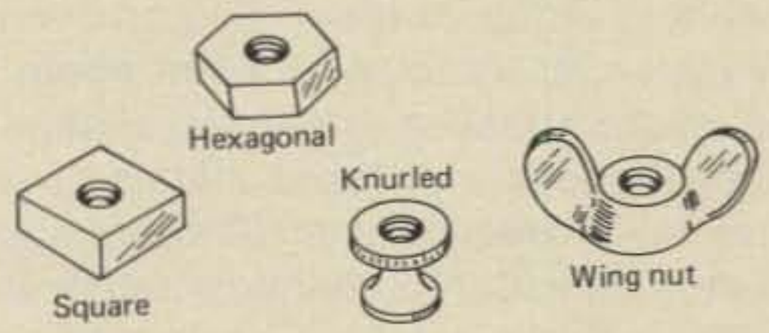


Fig. 13—Types of nuts with screws.

Nuts—A nut is a piece of metal with a threaded hole through its center made to fit the thread of a machine screw or bolt. They are classified according to shape (see Fig. 13), the size of the hole, number of threads per inch and the material. The hole size and threads per inch must correspond with the screw it is to be used with. For example, a 4-40 nut must be used with a 4-40 screw.

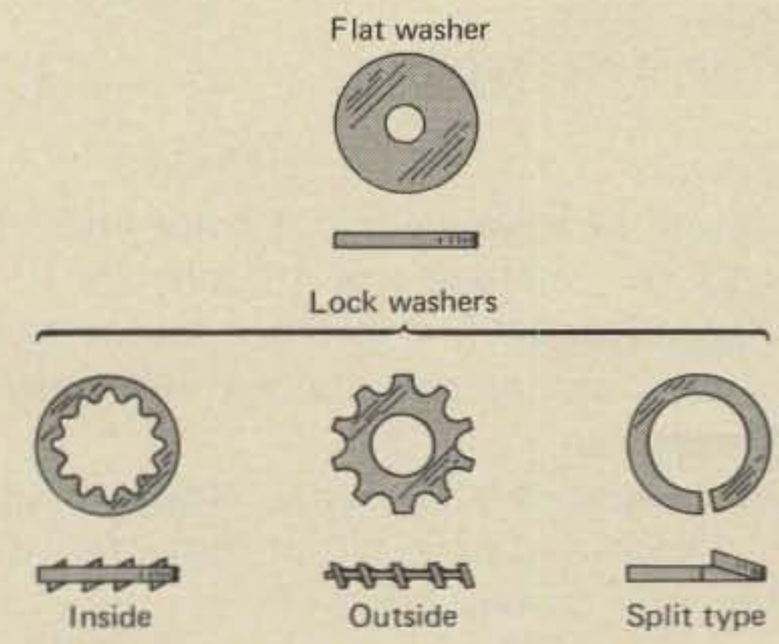


Fig. 14—Flat washers and lock washers.

Washers—Flat washers (Fig. 14) are used to distribute the pressure of a screw head over a larger area to give more holding power and also to protect the edges of the hole from the screw head. Lock washers are used to prevent a nut from working loose due to vibration over a period of time. Lock washers are placed under the nut only, and not under the screw head. The different types of lock washers are shown in Fig. 14.

THE ART OF SOLDERING

The many parts that form an electronic circuit must be carefully connected and these connections must allow an unimpeded flow of electrons. If the connecting wires are only twisted together they can come loose, or, because of oxide formations, develop poor or open connections. To assure a good permanent electrical connection the wires must be soldered together. If the wires are not properly soldered many faults will develop in the equipment such as noise, intermittent operation or no operation at all. It is necessary, therefore, that anyone aspiring to be an electronics technician must master the art of soldering.

Solder—Ordinary solder is a fusible alloy consisting of lead and tin is used to join two metals together without melting either of them. Solder merges with the other metals at a temperature of about 525° to 575°. The solder attaches to copper or steel by dissolving small amounts of these metals at temperatures much lower than their melting point and so a solder joint is considered chemical rather than mechanical. From this it can be seen that two conductors soldered together become a single solid conductor that in no way obstructs the passage of electrons.

Soldering Flux—If the metals being soldered are coated with oxides the solder cannot dissolve the small amount of metals necessary to form the connection. It is necessary, therefore, to be certain that all oxides are removed and that the metals are bright and shiny. Even when the surfaces of the metals being soldered *appear* clean the soldering process sometimes fails to occur because of ox-

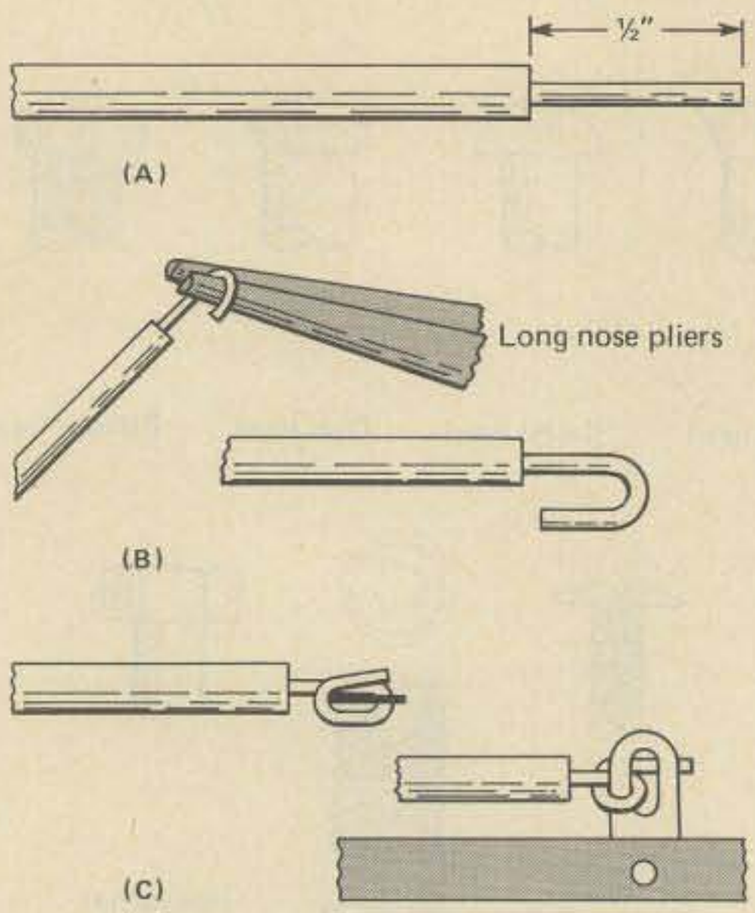


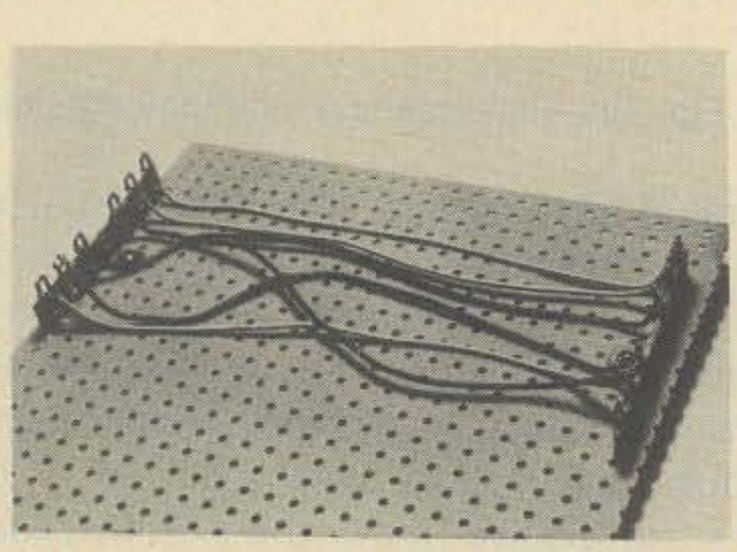
Fig. 15—Three steps followed to prepare for soldering. (A) Stripped off insulation. (B) Hook formed with long nose pliers. (C) Hook slipped over terminal. Insulation is kept at least ⅛" away from the terminal. The hook is turned a full circle with the long nose and then crimped.

EXPERIMENT—Soldering Practice

Materials:
1—Prepunched Perfboard
2—Terminal Strips
Assorted Solid Hookup Wire
Solder
4/40 Hardware

No amound of reading about soldering will teach you how to do it unless you actually *try* it. To give you the opportunity to learn to solder before we begin to wire actual circuits we will perform this practice exercise.

We will mount two terminal strips on the perfboard and wire a simple circuit between them and then solder the connections.



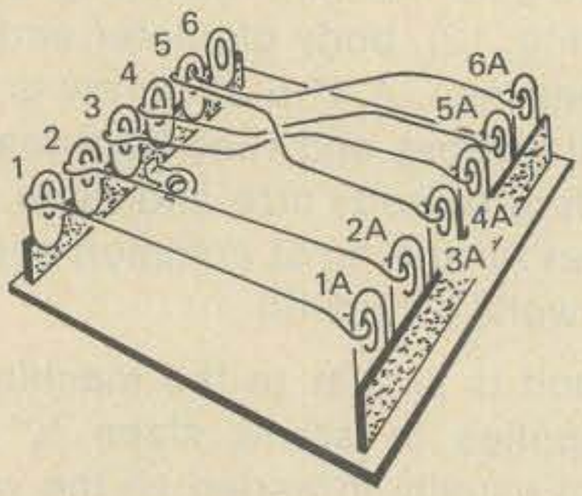


Fig. 1—Layout of wiring exercise done on a 6"x9" perfboard. Use #20 insulated hookup wire.

Procedure:
1—Mount two 6 lug terminal strips on the perfboard using 4/40 hardware. Locate the strips as shown in fig. 1.
2—Connect wires from terminal to terminal as follows:

a wire from	1 to 1A	4 to 5A
	2 to 2A	5 to 3A
	3 to 4A	5 to 6A

Wrap each wire as described in fig. 15 of the text.
3—Solder each terminal using the technique described in fig. 16 of the text for this month.

Remember, each solder connection should be smooth when cool and a minimum of solder should be used.

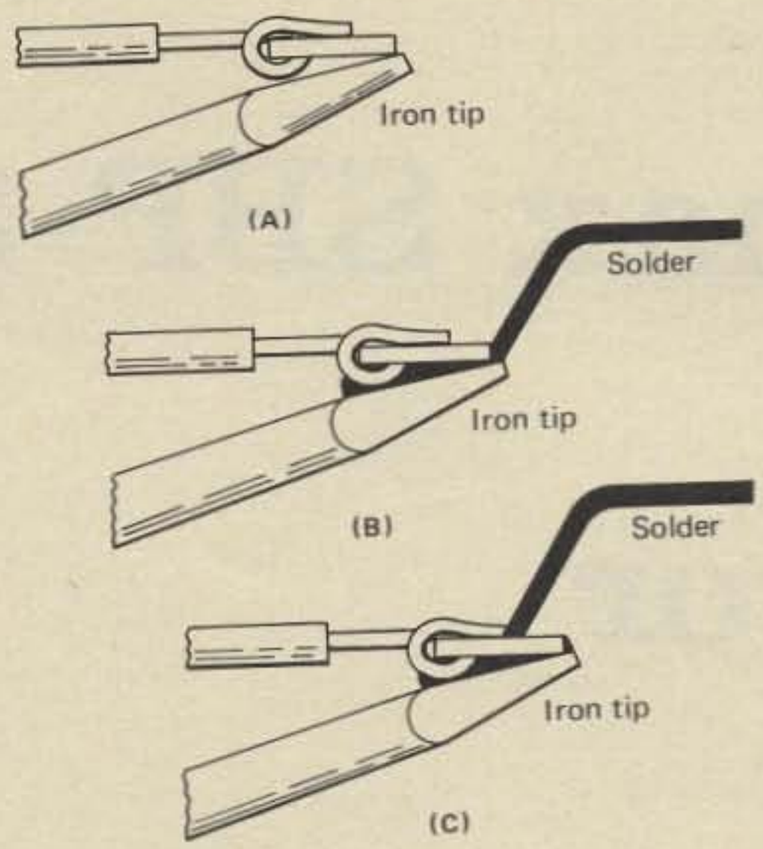


Fig. 16 (A)—The iron tip is placed in contact with the connection to heat it. (B) A little solder is applied to improve heat transfer. (C) Solder is then applied to the top of the connection. It should flow smoothly as described in the text.

ides. To help rid the metals of interfering oxides a material called *soldering flux* is used. The flux, when spread over the connection and heated, removes the oxides from the metal's surfaces and permits the soldering process to occur. The oxides stay suspended in the flux which boils to the surface of the connection and remains there.

There are two basic types of flux, acid and rosin. *Acid flux is never used for electronics work.* While it works fine, the acid residue will eat away the connections and in a matter of weeks or months the construction project will have to be discarded as useless junk. For electronics work only rosin flux is used as it is non-corrosive.

At one time flux had to be applied each time a connection was soldered. Today the flux is contained in the center of the solder and is called "rosin care" or "acid core" solder.

Types of Solder—Solder is a mixture of tin and lead with a flux core. The percentage of tin and lead affects the performance of the solder. The ideal mixture is 63 percent tin and 37 percent lead and will turn liquid at 361°. Most commercial solders are made with a 60/40 mix. If the percentages are changed, the temperature required to liquify the solder will rise. For example, 40/60 requires 460° to produce a liquid state and pure lead 0/100 requires 621°.

When purchasing solder the best mix is 60/40 (or 63/37, if available) and be sure that it is *rosin core*. In addition you can select the diameter of the solder that is best for the work you are doing. The gauges (the same as wire gauges) are 16, 18, 20 and 22. Gauge 16 is for standard work, 18 for small work and 20 and 22 for printed circuit work. For these experiments we should use 60/40 rosin core, gauge 18.

How to Solder—First you must be sure that the iron is fully heated and the tip tinned. Tinning the tip is the process of applying a thin, uniform layer of solder over the soldering surface of the tip as shown in Fig. 2. The solder will only stick to the tip if there are no oxides on the surface. After a period of use, oxides will reform on the tip and it will have to be retinned.

The flux in the solder will, over a period of time, eat away portions of the tip, pitting it. The rosin flux, however, is corrosive only when in a molten state and so does not affect the electronics circuit once it hardens. A pitted tip has to be reshaped with a file and then retinned. To keep it clean between tinnings, you may wipe it off with a rag at frequent intervals.

When the iron is ready, attention may be given to preparing the connection to be soldered. As shown in Fig. 15(A), the insulation is removed from the wire. In (B) it is formed into a hook using long nose pliers. In (C) it is wrapped around the terminal and it is crimped with long nose pliers.

Note that the insulation does not touch the terminal. If it does touch, the plastic will melt and run into the solder joint, foul it and prevent a proper connection from being formed.

The wire and terminal should be tinned and the wire properly wrapped around the terminal post so that it has good mechanical rigidity. You cannot depend on solder to provide mechanical strength.

The heated tip of the soldering iron is now placed on the connection in such a way as to provide the greatest area of contact to provide the greatest transfer of heat. Note from Fig 16(A) how little actual contact area there is. To increase the contact area apply a very little bit of solder as in Fig. 16(B) so that it may fill in the spaces and help transfer heat. When the connection has reached 361° the solder will melt but only when the connection reaches 525° to 575° will soldering take place. In Fig. 16(C) the solder applied from the top will melt at about 550° and flow smoothly over the entire connection. Hot, smoothly flowing solder has a bright silver appearance. The flux will burn off or evaporate, producing some smoke and fumes. With the iron tip placed underneath the connection all excess solder will run down onto the tip and come away when the iron is removed.

When the tip of the iron is removed, the connection will begin to cool; the wires should not be moved until the solder sets. As it cools the solder changes in a few moments from a bright silver to a dull gray, then back to silver. If the joint cools with a rough surface, it is an improper connection that could have been caused by inadequate heating, oxides on the surface or a wire moving. Reheat and apply a little solder to correct the connection.

CQ Reviews:

The Alpha/Vomax SBP-3 Split Band Speech Processor

BY HUGH R. PAUL*, W6POK

It doesn't require much tuning of the high frequency bands to discover that speech processors are very much in vogue for s.s.b. Whether r.f. or audio type processors are used the lure is the same, higher average power output at reasonable cost. It is the average power that determines the loudness at the receiving end. If this can be accomplished without excessive distortion, the effort is worthwhile.

With speech waveforms, the average power content is quite low compared to the peak amplitude. The goal of any type of processor is to remove the peaks and leave the portion of the waveform containing the majority of power. This is usually accomplished by clipping the waveform. The process of clipping results in distortion and alteration of the "sound" of the voice creating the waveform. If the amount of distortion can be held to an acceptable level, we can achieve an increase in average audio power, which when applied to a s.s.b. transmitter will result in an increase in average power output. Additional increases in average audio power can be achieved by the use of an a.g.c. system that will increase low voice levels and decrease high voice levels. This is called audio compression. The a.l.c. circuit in a s.s.b. transmitter is a form of compressor at r.f. frequencies because it will maintain the peak r.f. output below a given level even with a relatively large increase in audio input.

R.f. processors have long been considered superior to audio type processors because of lower harmonic distortion at high clipping levels. It is easier to filter out such harmonics at r.f. frequencies than at audio frequencies. With the introduction of the Alpha/Vomax SBP-3 Split Band Processor this is no longer true.

The Alpha/Vomax unit could be referred to as a "diamond in the rough". The small 2"×3¾"×6½" box is very plain in appearance and gives not a clue as to the capabilities built into it. The design principles of the processor are not unlike those currently employed in some audio processors used in the broadcast and recording industries. A description of its operation will be more readily understood if you refer to the block diagram illustration.

Microphone audio is amplified, its average level is detected and used as a control voltage for the

*291 Macalester Drive,Walnut, CA 91789

The Alpha/Vomax SBP-3 split band processor. (Photo by Sandra K. Paul)

a.g.c. amplifier. The audio is then applied to the inputs of four bandpass amplifiers, centered on 500 Hz, 800 Hz, 1300 Hz and 2100 Hz. Splitting up the audio spectrum and processing it separately contributes to the overall low distortion level of this processor. Since we are processing only narrow bands of audio frequencies, the harmonics that develop as the result of clipping can be more effectively filtered. Following the active band pass filters, the audio is hard limited to reduce voice peaks by 16 db. After the limiting process, the audio again passes through band pass filters which remove the distortion products produced by the limiting action. The four individual bands of audio are then re-combined to produce a full voice spectrum of processed audio.

Tests to determine the actual bandpass characteristics of the individual filters were not conducted, but it was determined that response fell off rapidly below 400 Hz and above 2400 Hz. Distortion measurements were made at various discrete audio frequencies. Maximum distortion was at the lower frequencies, but was less than 10%. The average of 5% claimed by the manufacturer is correct.

The human voice is a very complex waveform and is often very assymetrical. For this reason, a test for distortion with discrete frequency sinewaves is not always indicative of the total distortion figure that will be realized when the human voice is processed. Studies have shown that the average person cannot detect harmonic distortion by ear until it exceeds 10%; therefore, the detection of distortion as a result of processing is somewhat subjective. The majority of people listening to a signal with the Alpha/Vomax properly adjusted could not identify any distortion being present. This subjective evaluation should be sufficient to back up the manufacturer's claim that the Vomax is a low distortion device.

The unit is not difficult to operate, but some consideration should be given to the power level to which the transmitter is loaded. Average power output will be higher due to the increase in average audio power being applied to the transmitter. It is best not to exceed the c.w. power ratings of the transmitter. If you have a transceiver employing sweep tubes this is especially true, because you will exceed the safe plate dissapation rating of the tubes if loaded to normal s.s.b. levels, unless you can increase the amount of cooling air for the tubes.

If your a.l.c. action is not quite as good as it could be, it is possible that you will be overdriving the final when the Vomax is switched into operation. If the loading level is held to the established c.w. ratings, you will find on most rigs that you can switch the processor in and out without having to readjust the audio gain control on the transceiver. This will facilitate your demonstration of the advantages of audio processing.

The manufacturer claims a 6 db to 12 db increase

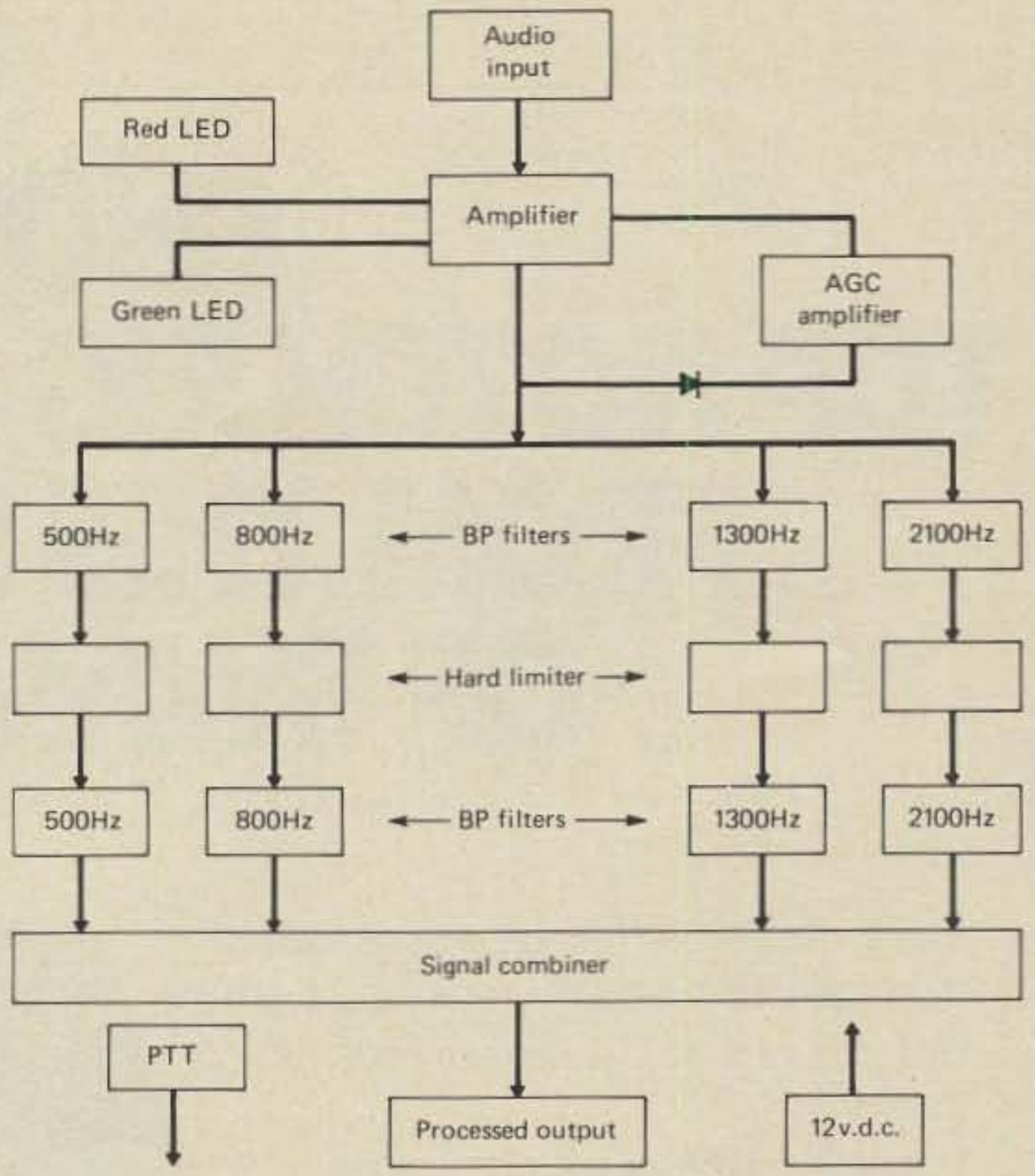


Fig. 1—Block diagram of the Alpha/Vomax SBP-3 speech processor.

in talk power depending on the condition of the communication path. If you are talking across the country with reasonable signal levels at the other end and you then switch in the Vomax, the person at the other end will see about the same results you could expect by doubling your power. In other words, a good 3 db increase in loudness. If your signal is only marginal copy, then the increase in apparant loudness could appear to be 6 db or greater at the listening end. Again, this is a subjective figure that depends on the conditions existing at any given moment.

The only controls to be concerned with on the Vomax processor are the switch to activate the processor and the gain control. While speaking into the microphone, the gain control is adjusted until the green LED flickers frequently. This indicates that full compression has been reached. A red LED will flicker when excessive voice peaks are present. At this level you will find background noise to be excessive between speech pauses.

The Alpha/Vomax SBP-3 sells for $179.50 and the 120 v.a.c. adaptor is an additional $10. That may seem a bit high for an audio processor, but I don't think its excessive for the level of performance exhibited by the Vomax. The processor carries a one year warranty against defects and a money back guarantee if you don't feel it performs as claimed. What more could you ask of a manufacturer? For more information contact Ehrhorn Technological Operations, Inc. P.O. Box 708, Industrial Park, Canon City, CO 81212 ■

CHOOSE TOP NOTCH RIG PERFORMANCE FROM THIS SHOWCASE OF SWAN METERS.

Swan precision meters are designed and built to help you make sure you're putting out all the watts your rig can deliver.

And Swan meters are priced so low they'll probably pay for themselves in improved rig performance and signal power.

At last. A precision wattmeter for the 2-meter man. The upper-band man needs accurate output measurements, too. Now our WM6200 gives them to him with ±7% accuracy output power at 50 to 150 MHz. Two scales to 200 watts. Reads SWR on expanded range scale.
WM6200 In-Line Wattmeter **$59.95**

Measure power coming and going. Measure SWR and get maximum power to your antenna. Then get your antenna pattern right by measuring relative radiated power. A one-two power punch at a knockout price. **FS-2 SWR and Field Strength Meter** **$15.95**

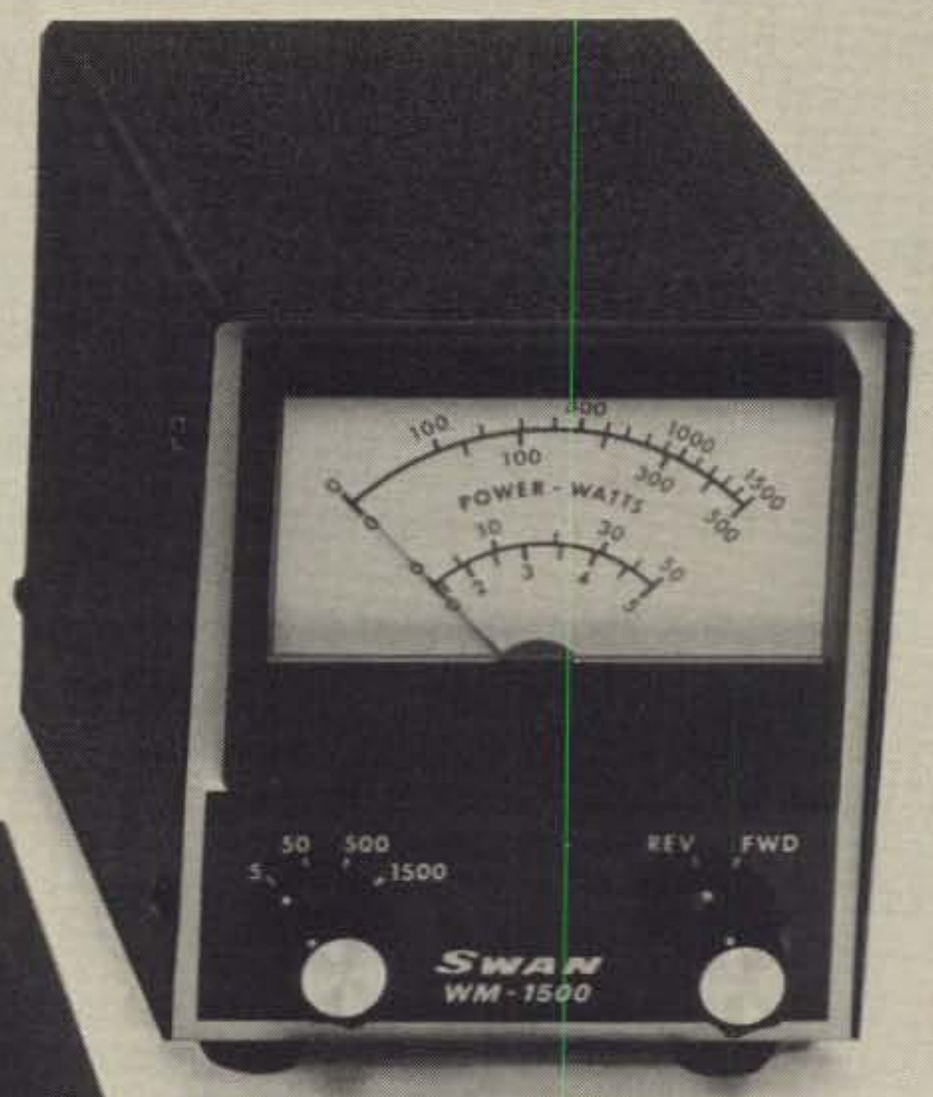
Easy-on-the-pocket pocket SWR. Mighty mite SWR meter with high accuracy, SWR-3 indicates 1:1 to 3:1 SWR at 50 ohms on frequencies from 1.7 to 55 MHz. Precision PC board directional coupler makes it a solid value at a rock-bottom price. **SWR-3 Pocket SWR Meter** . . . **$12.95**

SWR bridge bridges the price barrier. This little jewel gives you relative forward power and SWR on two 100 microampere meters at a remarkably low price. Rear mounted coax connectors for easy, neat installation. Capable of handling 1000-watt signals on frequencies from 3.5 to 150 MHz. With low insertion loss, it's great for mobile operations, too. **SWR-1A Relative Power Meter and SWR Bridge** **$25.95**

All-the-law-allows in-line wattmeter. With three scales to 2000 watts, new flat-frequency-response directional coupler for maximum accuracy and a price anybody can afford, this meter has become an amateur radio standard. 3.5 to 30 MHz with expanded range SWR scale.
WM2000 In-Line Wattmeter. . $59.95

This wattmeter tells the truth about SSB. True peak envelope power of your voice modulated signal is what you want to know most about your SSB transmission, and that's where our WM3000 shines. Flat response forward or reflected power from 3.5 to 30 MHz on scales to 2000 watts in RMS or PEAK at the flip of a switch. **WM3000 Peak/RMS Wattmeter $79.95**

Sniffs out radiated power wherever it is. This little unit is so compact it could measure relative radiated power in your pocket. Telescoping antenna and a frequency range of 1.5 MHz all the way to 200 MHz.
FS-1 Field Strength Meter $10.95



Double-duty in-line wattmeter. Use this meter for output power measurement and troubleshooting, too. Better than 10% full scale accuracy from 2 to 30 MHz, and you can go to 50 MHz with only slightly reduced accuracy. Four scales to 1500 watts and selector for forward or reflected power.
WM1500 In-Line Wattmeter . . $74.95

Put your frequency up in lights. Perfect tuning and matching don't mean a thing if you're not on frequency. This counter tells the story on big, bright 5-digit LED display. Reads to ±100 Hz or ±1 KHz between 5 KHz and 40 MHz. Signal levels to 50 millivolts so you can use as a test meter, too. **FC-76 Frequency Counter $169.95**

Use your Swan credit card for any Swan meter Applications at your dealer or write:

SWAN® ELECTRONICS
A subsidiary of Cubic Corporation
305 Airport Road · Oceanside, CA 92054 (714) 757-7525

Part II: Receiver Incremental Tuning (RIT) and loudspeaker modifications for the HW-8.

Super-Modified HW-8 Contest Machine

PART II: Conclusion

BY ADRIAN WEISS*, K8EEG

Of the modifications described in this two-part article, the Receiver Incremental Tuning (RIT) is perhaps the most important in terms of its impact upon the operational flexibility of the HW-8. One limitation of any basic transceiver design is that a single v.f.o. controls both receive and transmit frequencies. A design convention is to incorporate some type of mixed frequency offset into a transceiver so that when the transceiver v.f.o. is tuned to an incoming signal to produce a note in the audio range (typically 500-1000 Hz) in the receive mode, the offset circuit will produce a v.f.o. shift that will put the transmitted signal zerobeat with the incoming signal. Unless the transceiver design incorporates an "incremental tuning" circuit, this transmit-receive offset is fixed, so that the operator is limited to listening to incoming signals on one sideband only if his transmitted signal is to be zerobeat with them.

In the HW-8, the fixed offset circuit (C55-D11-R36) is set at about 700 Hz, which means that in the transmit mode, the v.f.o. is actually shifted downward some 700 Hz below the v.f.o. frequency of the receive mode. So, when the HW-8 tunes downward onto a signal to produce a 700 Hz audio note, the v.f.o. frequency, to use an example, would be 7050.7 kHz for reception of a signal at 7050.0 kHz. If the exact same v.f.o. frequency were used in the transmit mode, the HW-8 signal would be at 7050.7 kHz rather than zerobeat with the incoming signal at 7050.0 kHz. Now, if the operator at the other end has his receiver v.f.o. at 7050.7 kHz, the HW-8 transmitted signal will be zerobeat with his receiver v.f.o., and will produce no audio, and hence he won't even hear the HW-8. The explanation of why the HW-8 offset is effective only when tuning onto a signal from above can be illustrated by following the above example one step further. Suppose the HW-8 tunes onto the 7050.0 kHz signal from below. In order to produce the 700 Hz audio note, the HW-8 v.f.o. will be set at 7049.3 kHz, or 700 Hz *below* the 7050.0 kHz zerobeat. Now, when the v.f.o. is switched to the transmit offset frequency, which is 700 Hz below the receive frequency, the HW-8 transmitted signal will appear at 7048.6 kHz, or 1.4 kHz away from zerobeat. The other operator very likely won't even know that the HW-8 signal is present, either because it is too high in frequency to pass thru his c.w. filter, or because it falls in the sideband rejected by his receiver i.f. filter.

Now, this is a severe limitation in a QRM situation. To continue with our example, suppose that, in addition to the desired signal at 7050.0 kHz, there is also a strong incoming signal at 7051.5 kHz. With the HW-8 v.f.o. set at 7050.7 kHz, this undesired signal will appear as a 800 Hz audio note, and only an extremely sharp audio filter will permit the operator to distinguish between this note and the 700 Hz note from the desired signal at 7050.0 kHz. With the HW-8's fixed offset as described above, the operator is in an impossible situation. If he tries to separate the desired and undesired signals by varying the v.f.o. receive frequency, he automatically shifts his transmit frequency and the other operator may lose him. If he stays put to avoid confusing the other operator, then he can't copy the incoming signal! Solution—Receiver Incremental Tuning (RIT).

Receiver Incremental Tuning permits the operator to shift the v.f.o. receive frequency on both sides of a fixed zerobeat transmit frequency (which, remember, is zerobeat with the incoming signal's frequency). In the above situation, the undesired signal at 7051.5 kHz is eliminated simply by tuning the v.f.o. to 7049.3 kHz by means of the RIT. Then the desired signal produces a 700 Hz note, and the un-

83 Suburban Estates, Vermillion, SD 57069

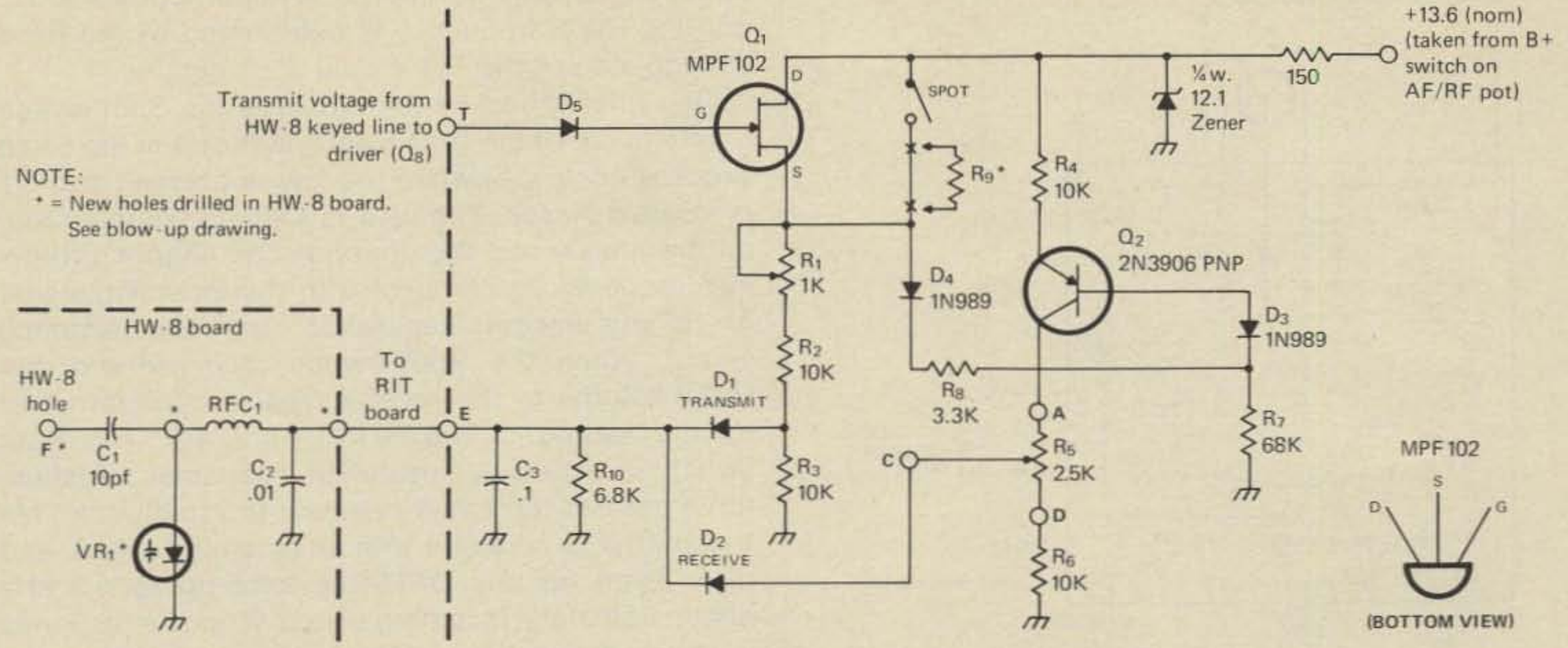
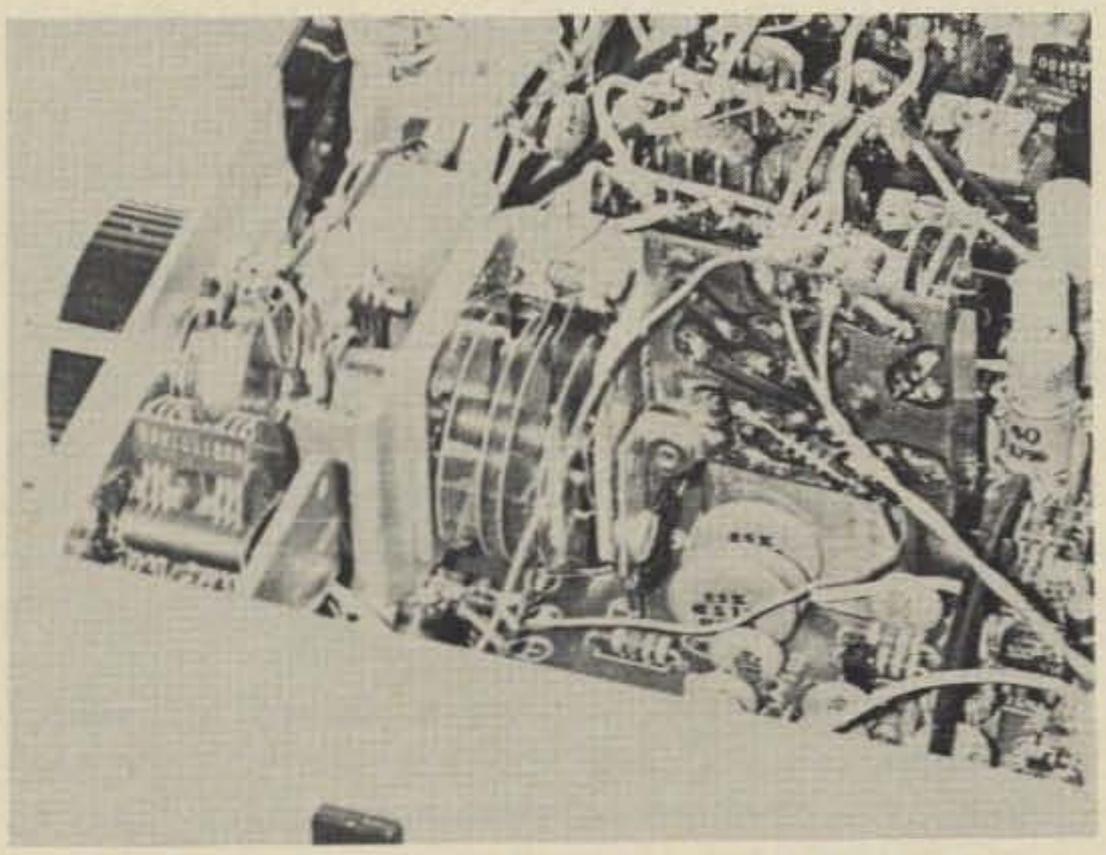


Fig. 4—HW-8 RIT Circuit. RFC1—Amidon FB-43-801 jumbo bead with 19 turns #28 (600 μH or larger, commercial 1 mH suitable). VR1—HEP2503/MV2503, 33 pF tuning diode. All diodes 1N989, 1N956, 1N914 or similar.

desired signal produces a 2200 Hz note, eliminating it as QRM. Since the transmit frequency is fixed at 7050.0 kHz, it is always at the same place, regardless of where the v.f.o. is in the receive mode, and the other operator copies a signal that stays put! An added advantage of the RIT circuit being described is that the switching between receive and transmit frequencies is automatic—hit the key and the v.f.o. is right back to zerobeat.

Figure 4 shows the HW-8 RIT circuit. Its operation is as follows. VRI is a variable capacitance diode (varactor diode) whose capacitance is linearly proportional to the amount of reverse bias placed on its cathode. This varicap replaces the standard variable tuning capacitor, but with an important advantage—shifts of capacitance can be achieved simply by switching the level of reverse bias voltage on the cathode. No mechanical turning of a shaft is necessary. When placed in a tuned circuit, a shift in bias voltage produces an instantaneous shift in frequency. The varicap is inserted into the HW-8 circuit in parallel with C302A, the v.f.o. main tuning capacitor, and any change in its bias voltage causes a change in total v.f.o. tuning capacitance, and hence, a change in v.f.o. frequency.



RIT board mounting detail. The "L" bracket with short leg bent 90 degrees is mounted on the bottom rear of v.f.o. tuning capacitor C302. The RIT board is then bolted directly to the short leg for stability and ground contact.

For our purposes, two bias control voltages are required: a fixed one which establishes the transmit frequency, and a variable one which permits a frequency shift of about 1.2 kHz either side of the transmit zerobeat frequency. In figure 4, the fixed transmit control voltage is taken from a resistive divider R1-R2-R3. The variable receive control voltage is taken from the resistive divider R4-R5-R6. R1 is adjusted to produce a transmit control voltage at D1 which is equal to the receive control voltage produced at D2 when the RIT tuning potentiometer R5 is set at midrange. Hence, when R5 is set at midrange, both transmit and receive frequencies are the same; when R5 is set either side of midrange, the receive frequency separation from the fixed transmit frequency is proportional to the distance from R5 midrange.

In order to achieve automatic switching between transmit and receiver frequencies, transistor switches Q1 and Q2 are used to select either the transmit or receive mode. In the receive mode, Q2 is forward biased through D3-R7 and conducts, causing the appearance of the receive control voltage at D2. At the same time, Q1 is non-conducting since

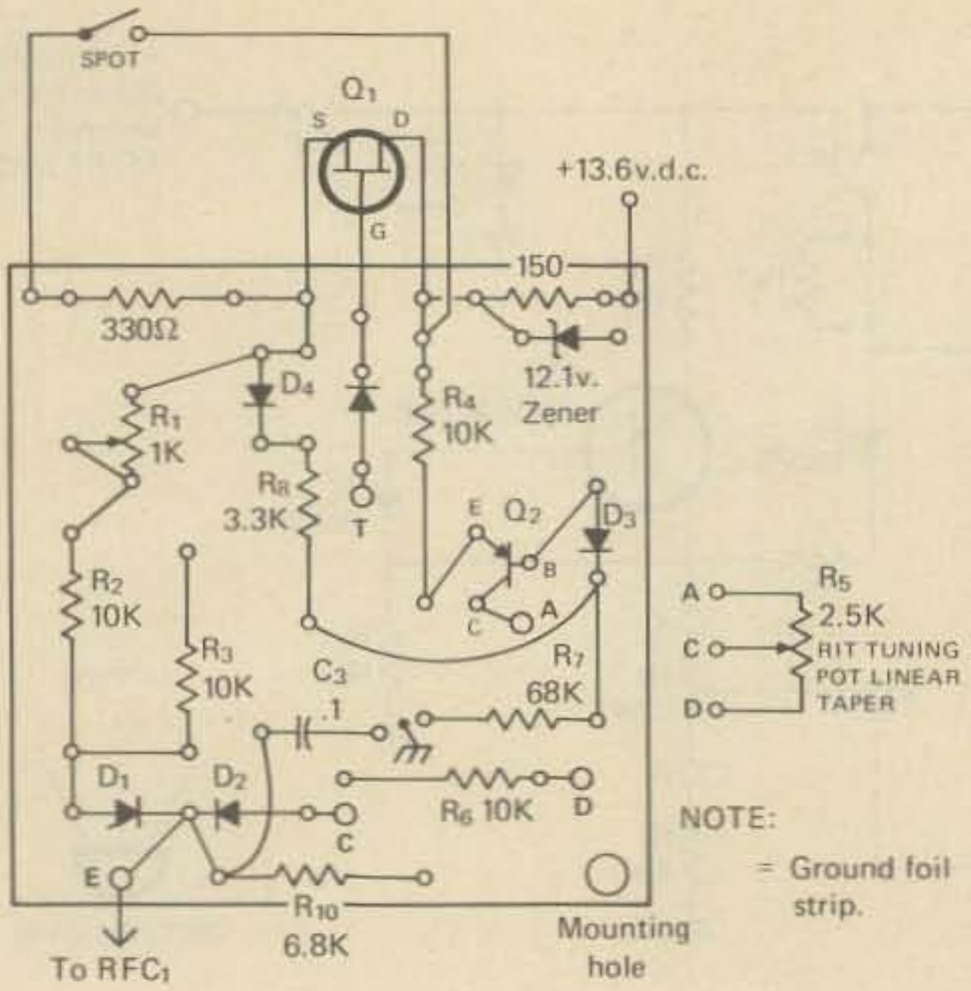


Fig. 5—HW-8 RIT Circuit Board. Board shown actual size. Resistors are ½-watt. Diodes 1N989, 1N956, 1N914 or similar. Q1—MPF102. Q2—2N3906 PNP or similar. R1—1,000 pot. Spot switch—SPST, spring momentary contact. Note: ¼-watt resistors adequate; carefully check hole drilling points against actual part sizes. Size of board can be enlarged as there is lots of space available in the HW-8.

no bias is applied to its gate. In the transmit mode, the HW-8 keying voltage developed by keying stage Q11 is applied as forward bias to the gate of Q1, causing it to conduct when the key is pressed. Two effects occur simultaneously when the key is closed. First, Q1 conducts, current flows thru R1-R2-R3, and a transmit control voltage appears at D1. Second, current flows from the Q1 source thru D4-R8-R7, developing a voltage at D3-R7 which reverse biases D3 and cuts it off, thereby breaking the connection between the Q2 base and R7 and thus removing bias from the Q2 base and stopping Q2

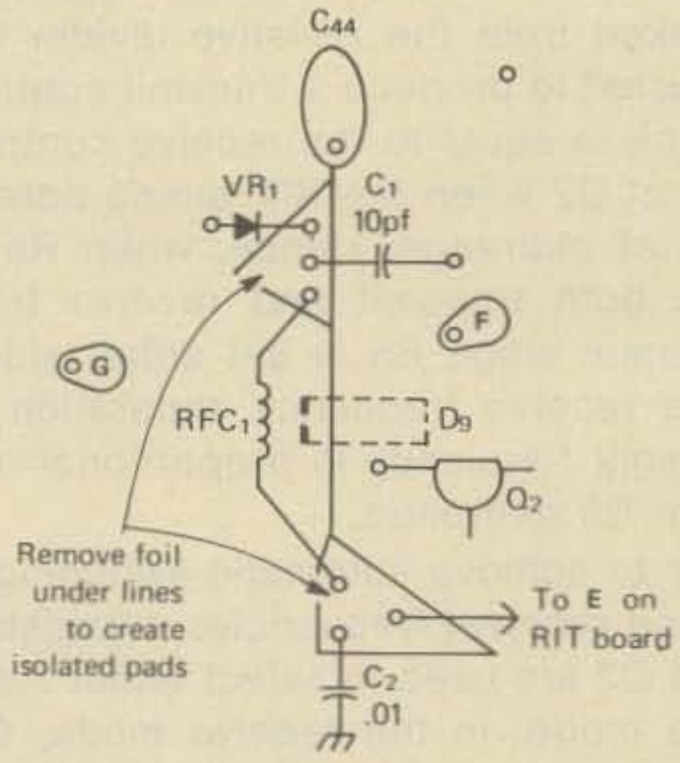
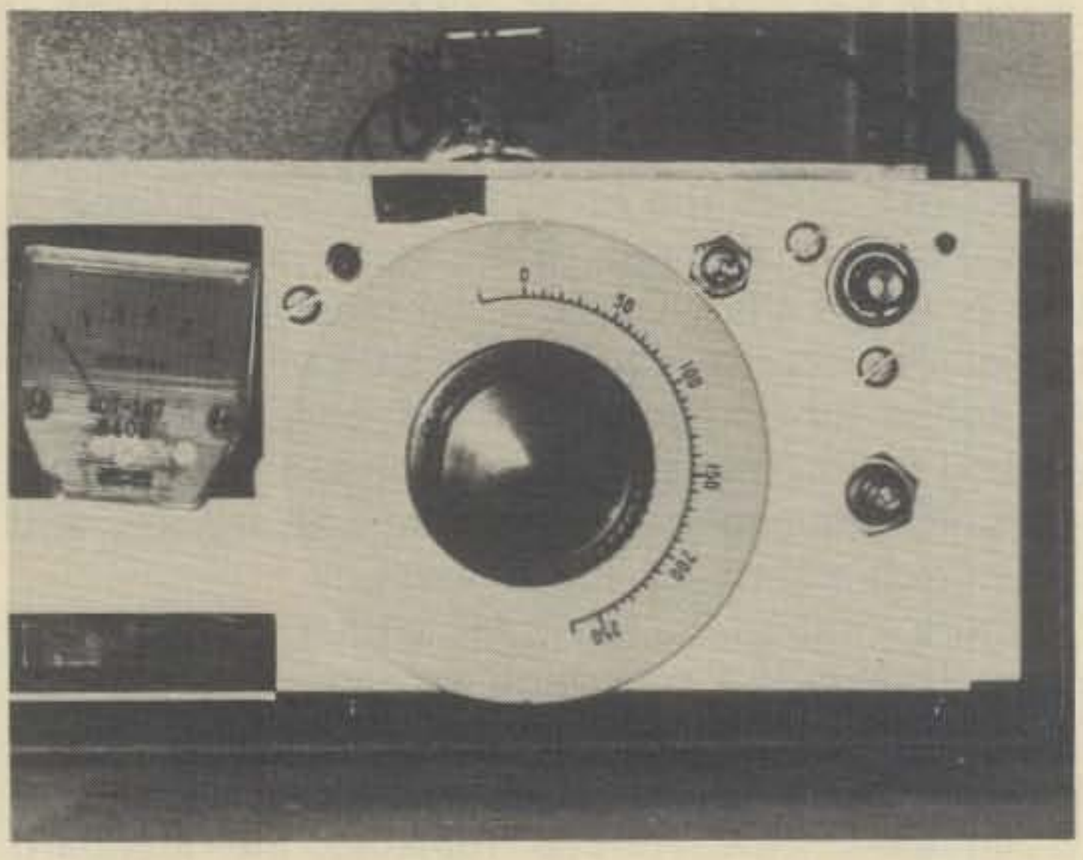


Fig. 6—HW-8 Main Circuit Board. Modifications for addition of RIT.

conduction. Thus no control voltage appears at D2 and the HW-8 frequency is determined by the fixed voltage side of the RIT circuit.

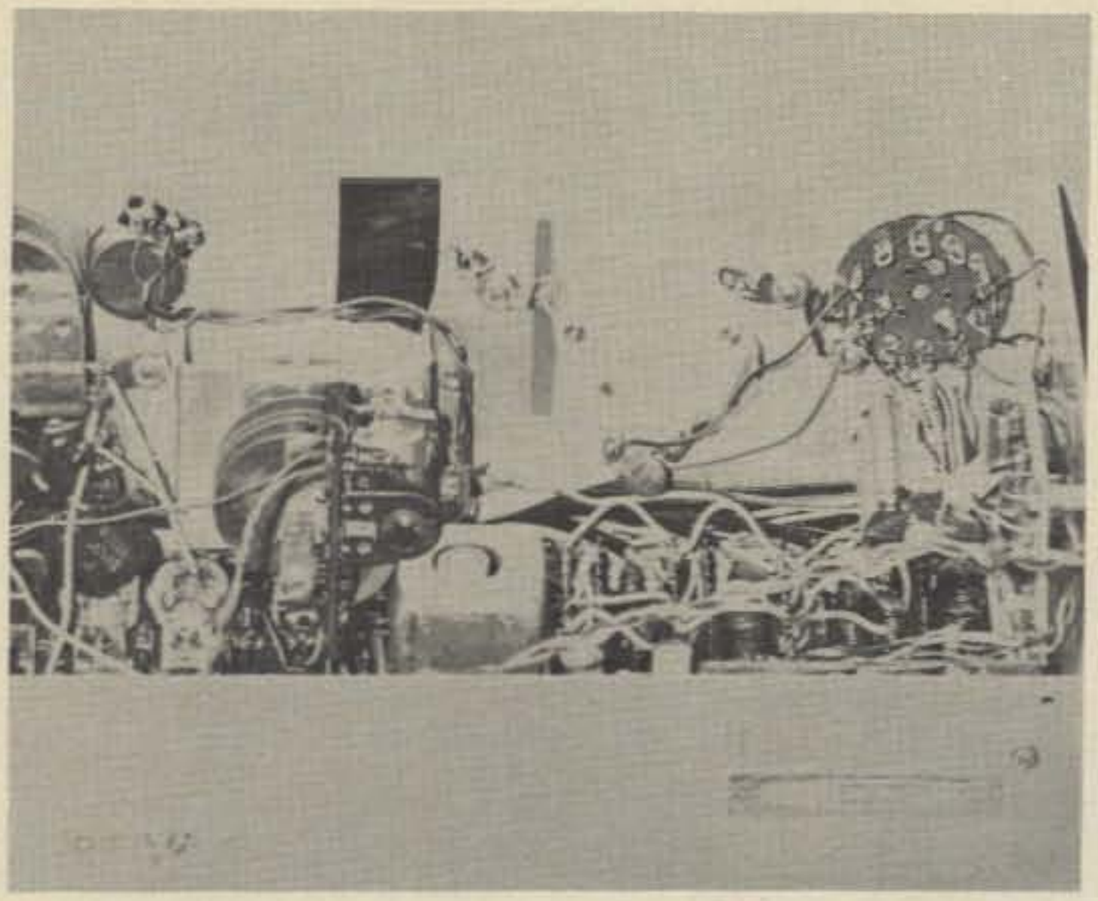
One final aspect of the circuit is the *Spot* switch function. When the Spot switch is pressed, the same process occurs as when the key is pressed and Q1 is forward biased. The v.f.o. is switched to the transmit frequency and the operator can align his transmit frequency to zerobeat with the incoming signal or to any desired separation from the incoming signal. When the Spot switch is depressed, the HW-8 returns to the receive frequency determined by the setting of the RIT control, R5. The Spot switch is especially useful in a contest situation, for it permits the HW-8 operator to rapidly tune his transmitter to zerobeat with an incoming signal, and then listen on any QRM-free spot up to 1.2 kHz either side of the incoming signal. When he responds to the incoming signal, his transmitted signal will be right where the other station is listening for a response—at zerobeat.



Position of R5 RIT tuning pot to provide about 1/32 inch clearance between nut and dial plate.

Figure 5 shows the full-size p.c. board template for the RIT control voltage circuit. Parts layout is not critical, and the experimenter can enlarge the board if he wishes, as quite a bit of space is available in the HW-8 box. The RFC1, VR1, C1, C2 circuitry is mounted right on the HW-8 p.c. board as is described in detail in the following steps. Once the p.c. board is assembled, initial checkout and adjustment should be completed before installation in the HW-8. This process follows.

( ) After checking the RIT p.c. board for solder bridges, shorts, and correct parts placement and foil connections, connect the B+ lead to terminal 8 of the a.f./r.f. gain pot AF (see Pictorial 4-4), and connect the ground lead to the HW-8 chassis. Measure the receive control voltage that appears at D1-D2 with a VOM or VTVM as R5 is rotated thru its range; note the range,



R5 clearance from preselector tuning capacitor. R5 A-C-D twisted wire cable shown against front panel and above vernier bracket, down the side of the bracket, and to the A-C-D holes on RIT board. Transmit adjusting pot R1 clearly seen on edge of RIT board. Black tape at center of front panel holds panel light lead. Pilot light barely visible between black tape and meter-mounting lug. New selectivity/SWR switch upper right corner.

and calculate the midrange voltage point. The unit discussed showed a range of 2.6-3.4 volts, with 3.0 volts as midrange.

( ) Connect the "T" lead from the RIT board to HW-8 SW4, pin 6, where the yellow lead from the HW-8 "T" hole is connected (see Pictorial 3-3). This lead provides the transmit bias to Q1.

( ) With a dummy load connected to the HW-8, press the key and measure the transmit control voltage that appears at D1-D2 output. Adjust R1 so that the transmit control voltage is equal (as close as possible) to the R5 midrange point noted in a previous step.

( ) Press the Spot switch and measure the Spot voltage that appears at D1-D2. The Spot control voltage should be the same as the transmit control voltage, but because transistors used at Q1 may exhibit different internal resistances, causing a slight voltage drop at the source point, it may be necessary to insert a small value resistor shown as R9 in figures 4 and 5 to bring the Spot control voltage in line with the transmit control voltage. The unit discussed required an R9 of 120 ohms.

( ) Once the above adjustments are completed, the control voltage should be the same in the transmit and Spot states, and R5 midrange should be about that same level, although it need not be precisely the same. Lay the RIT board aside.

( ) Remove the bottom shell of the HW-8, and locate the foil strips as shown in figure 6. Three areas will be drilled in the HW-8 p.c. board for

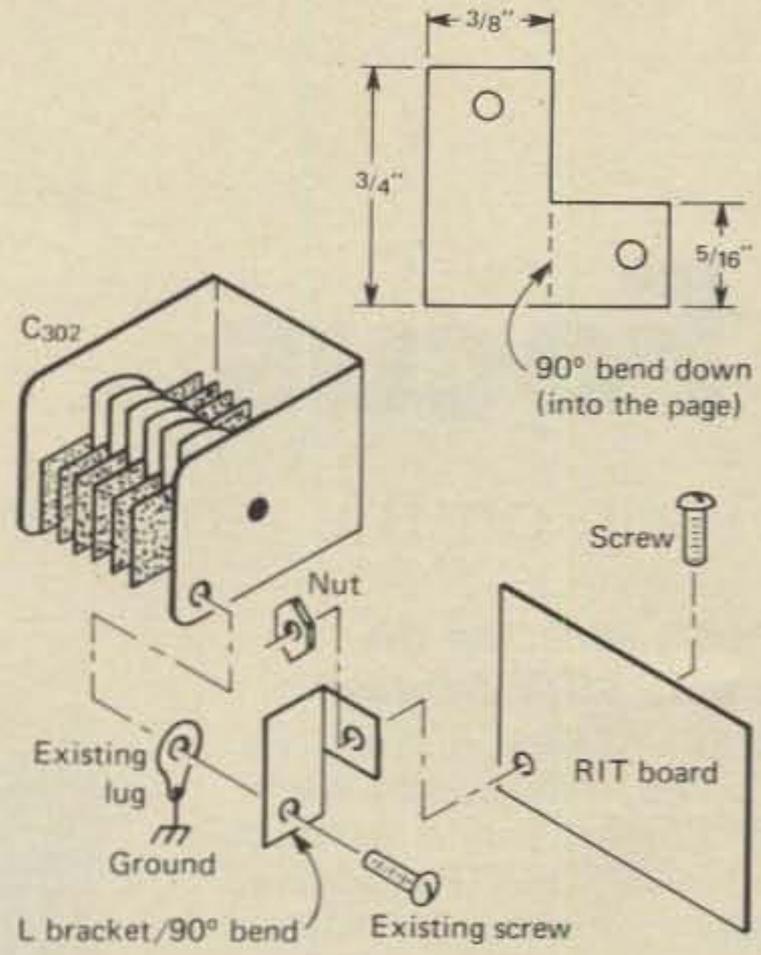


Fig. 7—RIT Board Mounting Bracket Detail.

mounting of RIT parts. Using a small drill bit (1/32 inch or smaller), drill the holes as shown in figure 6. If an RFC1 of different size than the one indicated is used (wound on the FB-43-801 jumbo bead), the three holes at the low end of the ground foil should be moved closer to the board edge to accommodate the length of the choke being used.

( ) Mark the bold lines on the foil of the HW-8 p.c. board as shown in figure 6. Lay a straight-edge (ruler, etc.) along one line, and gouge away the foil covered by the bold line with the sharp edge of a tool such as a penknife, file, or screwdriver, until the foil covered by the bold lines is completely removed. Repeat with the other lines until the foil pads are completely isolated from the surrounding foil.

( ) Turn the HW-8 over, and insert C1, C2, RFC1, VR1, and a 5-inch lead "to RIT board" in the proper holes; solder all leads. Be sure that the anode-cathode leads of VR1 are in the proper holes. C2 is mounted flat against the p.c. board on the underside.

( ) Refer to photo 4 for RIT board mounting detail. Cut an "L" shaped bracket from 1/16 inch or so aluminum stock as shown in figure 7, and drill holes to accept the existing screw on the rear of C302, and to accept a screw to attach the bracket to the RIT board.

( ) Remove the front panel of the HW-8, and carefully position a hole for mounting the miniature RIT tuning control (R5) as shown in photo 5. Be sure to leave about 1/32 inch clearance between the R5 mounting nut and the dial plate. When the exact center of the mounting hole has been determined, draw crosshair lines to the

(Continued on page 85)

a monthly feature by

BILL DEWITT, W2DD

In Focus

Television on the Amateur bands

W3LSG Wins The 7th Worldwide SSTV Contest!

Dave Wilke, W3LSG, of York, Pa. took top honors in the recent Worldwide SSTV Contest with a score of 50,336. Don Miller, W9NTP, squeaked by B. Zwerver, PA0ZH, to make it first and second for W-land. Complete scores for the contest are included at the end of this column. (Thanks to Dave and I4LCF.)

Dave's big super-quad (pictured in this column not too long ago) combined with his Captain Crunch linear —and smart operating techniques conquered the QRM jungle. Congratulations to W3LSG, W9NTP, and PA0ZH for taking the prizes and a hearty "Well done!" to all who took part and submitted logs.

Next time you're making up a tape for demonstrating SSTV to your club or friends, remember these SSTV contests. They provide a wonderful source of DX demonstration material and good opportunities to increase your "countries" score.

A Short Wave Viewer Points The Way

It's a rare week that brings no letter asking "How do I get started in SSTV?—And, "What's the minimal outlay for an SSTV monitor?" In answering these letters, I generally outline the possibility of converting a scope, starting with a PC board, etc. However, a letter I received recently from a chap who is not a licensed amateur really spells out what you can do, starting from scratch—without spending much money. To help others who ask the questions just mentioned, I am publishing parts of this excellent letter from Bill Cikas, 1627 Paradise Blvd., Rockford, Ill. 61103.

Bill now has a working monitor and in addition, he has solved some of the problems of photographing SSTV images on a P-7 screen.

I have taken the liberty of doing some excerpting and editing of Bill's letter, but I think you'll agree that the initiative and ingenuity shown by Bill still come through loud and clear. Here's his letter:

Dear W2DD,

"First of all, I hold no class of license at all, but I am an avid project builder! I was turned-on to the existence of SSTV by my brother—and went right to work adapting my Dumont 304 scope according to the 1976 *ARRL Handbook* procedure.

"Last April I produced my first picture from tape recordings on hand. Monies spent on the SSTV converter were as follows: Dumont scope $20, 5ADP7 CRT $10, adapter and power

*2112 Turk Hill Road, Fairport, NY 11450

Fig. 2—WB5SAJ makes the scene! This picture demonstrates the close-up capabilities of Bill Cikas' system for photographing P-7 displays as described in the text.

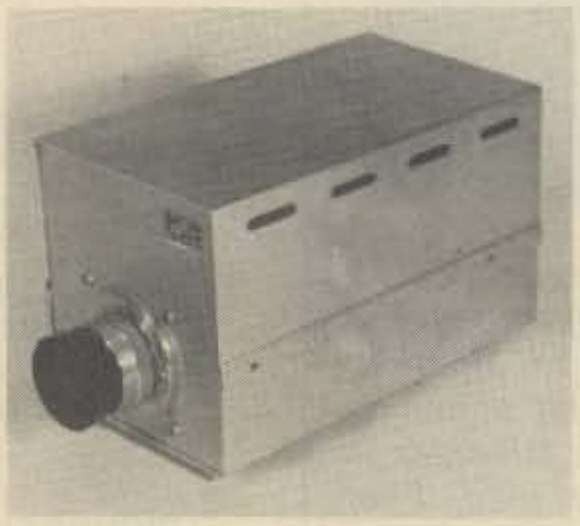


Fig. 1—By the time you read this caption some lucky slow scanner will be claiming this neat little ATV camera offered as first prize in the Second Annual Albatross SSTV Contest.

RESULTS OF THE 7th Worldwide SSTV Contest Sponsored by a cq electronica Magazine

1) W3LSG	121x/(10x4) + (8x47)/ =	50,336
2) W9NTP	107x/(10x5) + (8x24)/ =	25,894
3) PA0ZH	75x/(10x4) + (8x36)/ =	24,600
4) WA7QBV	71x/(10x5) + (8x34)/ =	22,862
5) I0PCB	63x/(10x3) + (8x23)/ =	13,482
6) G3WW	47x/(10x4) + (8x27)/ =	12,032
7) DL3DW	42x/(10x4) + (8x29)/ =	11,424
8) SM5EEP	42x/(10x4) + (8x21)/ =	8,736
9) I3AOS	36x/(10x5) + (8x19)/ =	7,272
10) IT9DQZ	36x/(10x2) + (8x20)/ =	6,480
11) G4CVZ	24x/(10x5) + (8x17)/ =	4,464
12) IS0PEM	25x/(10x2) + (8x15)/ =	3,500
13) MA6KVD/P	26x/(10x3) + (8x13)/ =	3,484
14) DL3UH	27x/(10x3) + (8x12)/ =	3,402
15) IT9KST	29x/(10x2) + (8x12)/ =	3,364
16) OZ1AT	21x/(10x3) + (8x15)/ =	3,150
17) I3MIQ	28x/(10x3) + (8x10)/ =	3,080
18) OK1ADP	20x/(10x4) + (8x13)/ =	2,880
19) SP3PJ	25x/(10x4) + (8x9) / =	2,800
20) IS0RUH	24x/(10x2) + (8x12)/ =	2,784
21) W6WDL	23x/(10x2) + (8x12)/ =	2,668
22) OK1JSU	22x/(10x2) + (8x12)/ =	2,552
23) EA4DT	20x/(10x1) + (8x9) / =	1,640
24) DJ2ZG	15x/(10x2) + (8x9) / =	1,380
25) W7FEN	14x/(10x2) + (8x9) / =	1,288
26) IK4LRH	15x/(10x2) + (9x8) / =	1,260
27) OH6NF	13x/(10x1) + (8x7) / =	858

Control Log. WB5SAJ

S.W.L.

1) HA5FA	31x/(10x3) + (8x19)/ =	5,642
2) I4YMO	37x/(10x3) + (8x14)/ =	5,254
3) BRS34898	30x/(10x3) + (8x18)/ =	5,220

Fig. 3—Another P-7 photograph by Bill Cikas. The Dumont 304 scope he converted to an SSTV monitor is partially visible in this picture made at a lower magnification than Fig. 2.

supply parts $35. You can't beat the system I got for $65!

"Receiver is a military BC348R and tape deck is an Akai 1800L. Antenna is a random length longwire.

"Having a Polaroid Square Shooter and the courage to try one package of film, I decided to try photographing the P-7 monitor screen.

"To handle the problem of focusing at close range I decided to try some lenses out of my junkbox. I got good results with five and seven inch focal length lenses taped right onto the regular lens mount. I set the camera lens distance at 3.5 feet.

"The back of these cameras hinges open. A piece of waxed paper taped in an old film pack approximately where the film lays provides a surface to focus on and a way to see what you are doing from the back. You have to remove part of the film pack to see the waxed paper from the back. This modified film pack should be placed in the camera and the back left hinged open.

"A light bulb can be used as a focusing target to find the optimum distance between the camera and subject for each lens selected.

"A box-like stand was made to raise the camera to the centerline of the CRT. I also used a wooden rod that slides through the box front-to-back—and up to the front plate on the scope. Marks along this rod indicate the right distance for each lens.

"The shutter will stay open indefinitely if the electric eye is covered by black tape (and the shutter control button is depressed).

"Black and white film is best. I use the Polaroid Type 87. *(Note from W2DD—Type 87 is OK for this purpose in a Square Shooter camera, but will be over-exposed if used for snapshots. It is fine for snapshots in several other Polaroid cameras.)*

"The shutter must be held open for the full eight seconds. The intensity control should not be set too bright.

"I'm enclosing two pictures to show how this system works—and for the benefit of those who may be as skeptical as I was before I tried out the idea!

"I will be glad to answer any questions anyone may have in regard to my gear as outlined in this letter.

73,

Bill Cikas"

Many thanks to Bill Cikas for his fine letter and the photographs of figs. 2 and 3. They provide a perfect example of how an individual with natural curiosity, a knowledge of electronics, and some initiative can create something useful with a minimal outlay of cash. To share the fun of almost any phase of ham radio you don't have to spend a mint, SSTV is no exception to the rule!

Fig. 4 Radio Communication Magazine's new SSTV scribe, Peter Burnett, G4BLL. If you look carefully at this picture, you can see that Peter sports another call, G6AIZ/T.

For more details on photographing SSTV images see "In Focus" for June, 1976.

News From Merrie Olde England

Starting with the August issue, Peter Burnett, G4BLL, will be writing a regular SSTV column for *Radio Communications,* the RSGB monthly magazine. My thanks to Peter for the excellent photo showing him at the mike in his well-equipped station. See fig. 4.

More News From England

A newsy note from Richard Thurlow, G3WW, is filled with all kinds of goodies. Richard reports that Ron Johnson, G3GRJ, has replaced all of the 7400 series ICs in his WB9LVI-designed scan converter with 74L00 series chips with a resulting reduction in current drain. The load drops from 1.19 to 0.05 amps. The 74L series are generally more expensive, so you may wish to consider cost as well as end results!

Replacements are as follows: 7400/74L00; 7483/74L83; 74121/74L121; 7475/74L75; 7402/74L02.

NOTE AND WARNING: On the following two ICs, the pin configuration is not compatible and they CANNOT be used as direct replacements: 7485/74L85; 7493/74L93.

G3WW also kindly supplied the accompanying photo of a WB9LVI-designed scan converter tied into a Sony 10 inch TV set by A. H. G. Waton, G3GGJ. See fig. 5. The picture is a little dark but you can see that G3GGJ did indeed do a nifty job of constructing the LVI converter.

VU2DK On Slow Scan? We Hope So!

Zal Kabraji, VU2DK, of Poona, India is very anxious to get started in SSTV. As shown in fig. 6 this handsome 28 year old bachelor has some beautiful homebrew equipment in his station. Now he wants to build a monitor but getting parts in his neck of the woods is TOUGH! At this writing, Zal's starting inventory is one 5FP7 tube, period. Since solid state devices and certain other parts are virtually unobtainable in Zal's area, several U.S. slow scanners anxious to get VU2DK activated on SSTV have banded together to send him some of the hard-to-get items. If you would like to join W3YAH and others in this effort, send a list of available parts to either Elmer Boyer, W3YAH, 306 Midland Ave., Lewes, Del. 19958 or W2DD at the address shown at the end of this column. Any other suggestions for helping Zal get op-

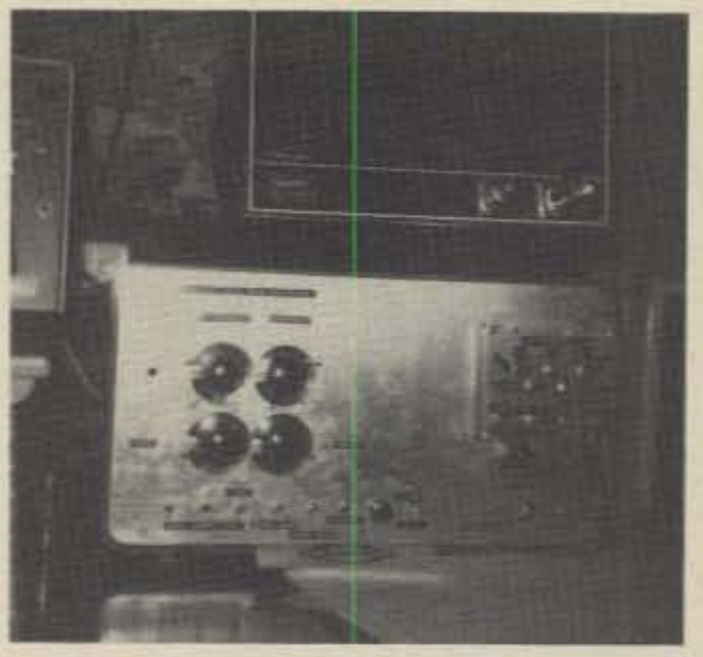


Fig. 5—A neat job of packaging a WB9LVI scan converter. G3GGJ combined his LVI scan converter with a Sony 10 inch TV set to produce this well articulated result.

Fig. 6—Homebrewed transmitting equipment generates that big signal from VU2DK. Zal Kabraji of Poona, India seems to be comptemplating his first SSTV contacts!

erational on slow scan would be most welcome.

More On Contests— Prizes For The Second Annual Albatross Contest

Prizes for the Second Annual Albatross SSTV contest are really worth going after! As mentioned in our August issue, first prize is a neat little ATV camera made by A.E.C. of Bologna, Italy. Second and third prizes are one year subscriptions to *CQ-TV Magazine*.

For a look at the first prize, see fig. 1. Thanks to Prof. Franco Fonti, I4LCF, for the photo and his continued efforts to increase interest in SSTV.

Black Is White?

Most manufactured slow scan gear has provision for reversing the polarity of the camera output so that the blacks and whites in the original subject appear oppositely on the screen. In similar fashion, scan converters generally include a "reversal" switch for the same purpose. This feature can be used to break the monotony of alpha numeric displays that aren't very exciting anyway. In addition, it sometimes happens that say, white letters on a black background come through better than the reverse under the prevailing band conditions. There is, however, another useful purpose to be served by this polarity reversing capability.

Fig. 7—Scan converted screen display of a film negative as described in the text. Your family snapshots can be a good source of picture transmission material.

See Negatives Positively

Black and white film negatives and color negatives such as Kodacolor II can be viewed as positives by use of the camera or scan converter polarity reversing feature and a simple illuminator such as that decribed in this column in January 1976 for the purpose of transmitting color slides. A film strip holder or track can be fashioned out of cardboard and tape to hold the negative strip in place over the illuminator. The TV camera is then positioned so that it "sees" the desired portion of the backlighted negative.

The scene displayed in fig. 7 looks like a direct TV camera view of some W2DD gear. Not so. The object being televised in this case is a black and white 35 mm. negative backlighted by the illuminator mentioned above. It is being televised by a Sony Model AVC-3000 camera and displayed via a Robot Model 400 scan converter on a 9 inch monitor. The image polarity reversal is accomplished in the scan conversion stage.

As a sidelight, I'd like to mention that it is a bit weird to discover that the brightness controls of the Robot 400 is working backwards—but of course it does, when you're viewing a film negative as a positive via this reversal feature!

Who Needs It?

Color negative films—snapshot films, are an excellent source of subject material for your SSTV transmissions. Like color slides, they provide a record of your family travels and events. So, why not use this source of pictures for your next taping session. No need to take your prints out of albums, just grab some negatives and see what you can do! One caution—be sure to fill the TV camera frame with the image of the negative. Light spilling around the edges can upset the automatic controls of some cameras.

There's More To This Idea

As a matter of fact, you'll soon discover that you are using a powerful tool for finding out which negatives are really good. If a negative is poorly exposed on either the under or over side, you'll notice the lack of either shadow or highlight detail. It's a good tool also for deciding which of several similar negatives you might want to select for more prints.

It's easy to imagine that amateurs who do their own photographic developing and printing could soon establish a calibration between this kind of negative viewing and enlarger exposures etc.

In The Professional Realm

This general area of use for TV principles is not exactly virgin territory. TV-based methods of viewing color negatives as positives have been around for quite a while. Kodak's Video Color Negative Analyzer is used by many large professional film processing and printing labs—and there are several competitive units on the market. Prices for this kind of equipment are in the $30,000 range. There is a great array of other related equipment used in the color motion picture field.

Feedback Is Fun

Getting back into the realm of P-7 and scan conversion systems used by amateurs (!)—If you decide to try viewing some of your film negatives as positives, please let me hear about your results. Other slow scanners would be interested in your experiments, so send along pictures of your equipment and the SSTV-displayed images. Please address your letters to that same old address, 2112 Turk Hill Rd., Fairport, N.Y. 14450.

Regards, Bill, W2DD

a monthly feature by

GEORGE JACOBS, W3ASK

Propagation

The science of predicting radio conditions

DX Contest Special

The 1977 *CQ* World Wide DX Contest will be held on the following dates:

Phone Section:

0000 GMT Saturday, October 29-
2400 GMT Sunday, October 30

C.w. Section:

0000 GMT Saturday, November 26-
2400 GMT Sunday, November 27

See page 24, *CQ* September, 1977 for complete details concerning the Contest.

For the 27th successive year, this month's Propagation column contains a special forecast for use during the Contest sections, both Phone and C.w.

Increasing Sunspot Activity

Finally, some good news about sunspots! Cycle 21 looks like its beginning to move upward. The Swiss Federal Observatory at Zurich reports a monthly mean sunspot number of 38.4 for June, 1977. Sunspots were visible every day during June, and ranged from a low of 8 on June 15, 16 and 17, to a high of 74 on June 25 and 27. This was the highest level of solar activity observed since August, 1975.

Solar activity observed during June results in a smoothed sunspot number of 14.7 centered on December, 1976. This is the first real sign that the new cycle is beginning to climb from its minimum level. A smoothed sunspot number on the order of 30 is predicted for the 1977 Contest period. This would be the highest level of solar activity during any Contest period since 1974.

If solar activity holds up as expected, DX conditions during the 1977 *CQ* DX World Wide Contest should be better than the Contest periods of the past two years, when solar activity was in the low teens. Expect improved DX conditions on all h.f. bands during this year's Contest.

*11307 Clara St., Silver Spring, MD 20902

LAST MINUTE FORECAST

Day-to-Day Conditions Expected For October, 1977

Propagation Index	*Expected Signal Quality* (4)	(3)	(2)	(1)
Day				
Above Normal: 14	A	A	B	C
High Normal: 2, 13, 16 20-21, 29-30	B	B	C	D
Low Normal: 1, 3, 5, 7-8, 11-12, 15, 17, 19, 22-23, 25-28	B	C	D	E
Below Normal: 4, 6, 10, 18, 24, 31	C	D	E	E
Disturbed: 9	D-E	E	E	E

Where *expected signal quality is:*

A—Excellent opening, exceptionally strong, steady signals greater than S9+30 dB.

B—Good opening, moderately strong signals varying between S9 and S9+30 dB, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S9, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.
2. With the *propagation index,* use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will open fair (C) on October 1st, improve to good (B) on October 2nd, fair (C) again on the 3rd, poor (D) on the 4th, etc.

For updated information dial Area Code 516-883-6223 for DIAL-A-PROP, subscribe to bi-weekly MAIL-A-PROP, P.O. Box 86, Northport, NY 11768.

Band-By-Band Conditions

The following is a band-by-band summary of DX propagation conditions normally expected from mid-October through mid-December, and centered on the 1977 Contest period.

10 Meters—Solar activity should be high enough for some *10* meter openings, particularly when conditions are High Normal or better. Fairly good openings should be possible to Central America, the Caribbean and much of South America during the daylight hours. Other openings may also occur to Europe, Africa, the Pacific Islands, Australasia and New Zealand. Conditions should peak towards the northeast, east and southeast before noon, and towards the northwest, west, south and southwest during the afternoon. If a radio storm should develop during the Contest, expect few openings on *10* meters.

15 Meters—A considerable improvement is expected in DX conditions on this band during October and November. When conditions are at least Low Normal, good openings should be possible to one area of the world or another from an hour or so after sunrise to almost sunset. The band should peak to Europe before noon; to Africa at about noontime; to South America during the afternoon, and to the Pacific, Australasia, New Zealand, the Far East and other Asiatic areas during the late afternoon, and possibly into the early evening when conditions are High Normal or better.

20 Meters—Although the band will close earlier than it did during the summer months, good DX openings should be possible to all areas of the world, sometime between the sunrise period and the early evening hours. Openings to many southern and tropical areas may be possible to as late as Midnight, particularly when conditions are High Normal or better. Signals should peak in *all* directions during a two-to-three hour window following sunrise, and again during the late afternoon. All-in-all, *20* meters should be the best DX band during the Contest.

40 Meters—DX openings towards Europe and in a generally easterly direction should begin during the late afternoon and improve with darkness. Good openings should also be possible towards the south during the hours of darkness. Openings in a westerly direction should peak during local sunrise in the USA, just before the band closes for DX propagation. Expect some good, strong signal openings on this band during the hours of darkness.

80 Meters—Expect fairly good DX propagation to many areas of the world during the hours of darkness and the sunrise period. Conditions should peak around Midnight on paths towards the east, shortly before

sunrise on paths to the north and south, and during sunrise on openings in a westerly direction from the USA.

160 Meters—With longer hours of darkness, DX conditions on this band should improve. While DX conditions may not be as good as on *40* and *80* meters, look for openings to many areas of the world during the hours of darkness and the sunrise period. Because of power limitations in force on this band in many areas of the world, signals are likely to be weak and noisy, especially on phone. The best time for *160* meter DX is when a path is in *complete* darkness. Within this period, conditions often peak just as the sun begins to rise at the *easterly* point on the path. The best forecaster for *160* meter DX (40 and 80 meters, as well), is a set of sunrise and sunset tables. For example, if the sun is expected to rise at 0700 GMT in western Europe, then this would be the best time to look for *160* meter openings between western Europe and the USA, plus or minus a half hour. Conditions on *80* meters can often also serve as an indicator for *160* meter openings. The band will often open at the same time *80* meters seems to peak on a particular path. With these tips and some patience, it should be possible to work many DX areas of the world on *160* meters during the Contest.

Contest Work Plans

The DX Propagation Charts on the following pages show the times when each amateur band from *10* through *160* meters is expected to open for DX from the United States to the major areas of the world. Instructions for the proper use of these Charts are given elsewhere in this column.

The information contained in the Charts can easily be reorganized into more convenient types of operational work plans, or schedules, which can serve as valuable propagation guides during the Contest. Experience gained during previous Contests has shown that such plans can be extremely useful in piling up contacts and points with a minimum of wasted time.

The following is an example of one of several type plans that can be devised. It shows, for each three hour period throughout the day, the areas of the world to which *20* meter propagation conditions are expected to be optimum. Only those openings shown in the Charts with a propagation index of (2) or higher were used in compiling this plan.

A western USA QTH has been chosen for this example, but similar plans can be devised for other locations, for other bands or for multiband operation, and for other time spans.

Sample 20 Meter Operating Schedule for Western USA QTH

Time PST	*Areas to which openings should be optimum*
00-03	No openings expected with a propagation index of (2) or higher. Some (1) openings should be possible to South America, South Pacific, New Zealand and Australasia, but this means conditions should be High Normal or better. This is a good time to catch up on some sleep.
03-06	About the same as the previous block.
06-09	Should open in just about every direction: Europe, North Africa, Eastern Mediterranean and Middle East, most of Asia and the Far East, Pacific Islands, New Zealand, Australasia, the Caribbean, Central America and most of South America. This is the period in which to rack up points.
09-12	About the same as previous period, but signals getting weaker and openings falling off.
12-15	Western and southern Europe, most of Africa, most of the Caribbean, Central America, and the northern countries of South America.
15-18	All of the Caribbean, Central America and South America, most of Africa, the Pacific Islands and New Zealand, the Far East.
18-21	Another peak period, and a good time in which to increase scores. Most of Asia including the Far East; the Pacific Islands, New Zealand and Australasia; Caribbean, Central and South America, but falling off; Antarctica.
21-00	South Pacific, New Zealand and Australasia, much of South America, Antarctica. A propagation index (1) opening to Europe and Africa.

Up-Dated Contest Propagation Info

In order to meet printing and publication deadlines, the "Last Minute Forecast" appearing in this column was made more than two months before the beginning of the Contest, and is subject to inaccuracy. For more accurate, updated propagation data, specially tailored for the radio amateur and available just before the Contest begins, check MAIL-A-PROP and DIAL-A-PROP.

A special MAIL-A-PROP forecast will be issued for both the Phone and C.w. sections of the Contest. MAIL-A-PROP forecasts, issued biweekly in newsletter form, contain day-to-day descriptions of expected conditions and openings on each h.f. band. Regular MAIL-A-PROP subscribers will automatically receive the Contest forecasts. An annual subscription to MAIL-A-PROP is $25 for 26 biweekly issues, postpaid. A special two month trial subscription, including the Contest forecasts, is available for $5, postpaid. Checks should be sent to MAIL-A-PROP, 11307 Clara Street, Silver Spring, Md. 20902, before October 10 in order to receive this special subscription.

A three minute summary of the special MAIL-A-PROP Contest forecasts will be carried on *CQ's* DIAL-A-PROP service beginning October 25 for the Phone section and on November 22 for the C.w. section. DIAL-A-PROP forecasts are available around-the-clock by dialing Area Code 516-883-6223. This *is not* a toll-free number, and you must pay for the call. The forecasts are issued every Tuesday, and are made for a week in advance.

National Bureau of Standards Radio Station WWV broadcasts geomagnetic and solar data at 18 minutes past *each* hour on 2.5, 5.0, 10.0 and 15.0 MHz. Geomagnetic activity is given in terms of the latest K-index measured at Boulder, Colorado. The previous day's A-index of geomagnetic activity and level of 10.7 cm solar flux are also given, as well as a forecast of geomagnetic and solar conditions given in subjective terms.

Table 2 relates the indices and terms given on these broadcasts with probable propagation conditions on the h.f. amateur bands.

Solar Activity

Geomagnetic Activity	K Range	A Range	Very Low S.F. = 70-90	Low S.F. = 90-110	Moderate S.F. = 110-130
Quiet	0-2	0-7	High Normal	Above Normal	Above Normal
Unsettled	2-3	7-15	Low Normal	High Normal	High Normal
Active	3-4	15-30	Below Normal	Low Normal	Low Normal
Minor Storm	4-5	30-50	Normal	Below Normal	Below Normal
Major Storm	5+	50+	Disturbed	Disturbed	Disturbed

Table 2—Solar and geomagnetic data broadcast hourly on WWV related to probable h.f. propagation conditions.

For example, a solar flux of 92 and an A-index of 9 should result in High Normal conditions. A forecast of low solar activity and an active geomagnetic field would probably result in Low Normal conditions.

The hourly forecasts broadcast on

WWV, along with the latest solar flux and geomagnetic indices, also may be obtained by telephoning Area Code 303-499-8129. This *is not* a toll free number, but there is no other charge for this service and it is available at any time.

Radio Storm

If a radio storm should develop during the Contest, expect conditions to drop to Below Normal or Disturbed to many areas of the world, depending upon its severity. Under such conditions, expect considerably fewer openings on *10, 15* and *20* meters. During periods of radio storminess propagation conditions on *40, 80* and *160* meters also become very erratic, with poorer conditions during certain phases, but with improved conditions at other times, particularly on paths to southern and tropical areas.

If a storm should develop, circuits passing through or near polar regions will become weak, fade considerably, or may even blackout completely. Concentrate on working the higher frequency bands, and paths to the northeast, north and northwest during the daylight hours, and the lower bands, and the paths to the east, south and west during the evening and early morning hours. A "Last Minute Forecast" for the Phone section of the Contest, made at press time, appears at the beginning of this column. A similar forecast for the C.w. section will appear in next month's column.

V.h.f. Ionospheric Propagation

Orionids, a major meteor shower is expected to last for about two days, peaking during the early morning hours of October 21 (7 a.m. EST), with an hourly count of about 25 meteors. This should make possible same fairly good meteor-type openings on the v.h.f. bands.

There is usually an increase in auroral activity during October, and some auroral-scatter type v.h.f. openings should be possible. There is also the chance for some short-skip sporadic-E propagation during periods of auroral activity, particularly on *10* and *6* meters. Best time to check for such openings is when conditions on the h.f. bands are expected to be Below Normal or Disturbed, as shown in the "Last Minute Forecast" appearing at the beginning of this column.

C.w. Contest Forecast

This month's *DX Propagation Charts* are valid for *both* the Phone and C.w. sections of the 1977 Contest. *Be sure to keep them handy for use during next month's C.w. section as well.* Short-skip propagation forecasts for October appeared in last month's column.

Past experience has shown that DX Contests are excellent periods in which to test the accuracy of the prediction methods used in the forecasts appearing in this column. Contests generate a large amount of activity in every corner of the world and on all h.f. bands. Observations made during previous Contest periods have helped considerably in improving the accuracy of these forecasts over the 26 years that they have been appearing in this column. Comments concerning the accuracy of this year's Contest forecasts would be appreciated, and should be sent directly to W3ASK, the Editor of this column.

Good luck in the 1977 Contest!

HOW TO USE THE DX PROPAGATION CHARTS

1. Use Chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8, KP4, KG4 and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9 and 0 areas; the Western USA Chart in the 6 and 7 areas, and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (15 through 80 Meters) for a particular DX region, as shown in the left hand column of the Charts. A ** indicates the best time to listen for 10 meter openings; * best times for 160 meter openings.

3. The *propagation Index* is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of *days* during the month on which the opening is expected to take place as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this Propagation column for the actual *dates* on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

4. Time shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M., 13 is 1 P.M., etc. Appropriate *daylight* time is used, *not* GMT. To convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 GMT, etc.

5. The charts are based upon a transmitter power of 250 watts c.w., or 1 kw, p.e.p. on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 db gain above these reference levels, the *propagation Index* will increase by one level: for each 10 db loss, it will lower by one level.

6. Propagation data, contained in the Charts has been prepared from basic data published by the Institute For Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado, 80302.

October 15-December 15, 1977
Time Zone: EST (24-Hour Time)
EASTERN USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	09-11 (1)	08-09 (1) 09-11 (3) 11-12 (2) 12-13 (1)	06-07 (1) 07-08 (2) 08-09 (4) 09-11 (3) 11-13 (4) 13-14 (3) 14-15 (2) 15-17 (1)	16-17 (1) 17-18 (2) 18-20 (3) 20-02 (2) 02-03 (3) 03-04 (2) 04-05 (1) 19-21 (1)* 21-23 (2)* 23-02 (3)* 02-03 (2)* 03-04 (1)*
Northern Europe & European USSR	09-11 (1)	08-09 (1) 09-10 (2) 10-11 (1)	06-07 (1) 07-10 (3) 10-13 (2) 13-15 (1)	17-19 (1) 19-22 (2) 22-01 (1) 01-03 (2) 03-04 (1) 19-21 (1)* 21-01 (2)* 01-03 (1)*
Eastern Mediterranean & Middle East	08-10 (1)	08-09 (1) 09-11 (2) 11-12 (1)	06-10 (1) 10-12 (2) 12-15 (3) 15-16 (2) 16-18 (1)	18-20 (1)* 20-00 (2) 00-02 (1) 20-22 (1)* 22-00 (2)* 00-01 (1)*
Western Africa	10-12 (1) 12-13 (2) 13-14 (1)	08-10 (1) 10-12 (2) 12-13 (3) 13-15 (4) 15-16 (2) 16-17 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-15 (2) 15-16 (3) 16-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	18-20 (1) 20-02 (2) 02-03 (1) 20-22 (1)* 22-01 (2)* 01-02 (1)*
Eastern & Central Africa	10-13 (1)	08-12 (1) 12-14 (2) 14-15 (1)	07-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	20-01 (1) 22-00 (1)*
Southern Africa	10-12 (1)	08-10 (1) 10-11 (2) 11-13 (3) 13-14 (2) 14-15 (1)	07-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1) 22-00 (1)	18-19 (1) 19-22 (2) 22-23 (1) 19-22 (1)*
Central & South Asia	*Nil*	09-11 (1) 17-19 (1)	07-08 (1) 08-10 (2) 10-12 (1) 19-21 (1)	05-07 (1) 18-21 (1) 05-07 (1)* 18-20 (1)*
Southeast Asia	*Nil*	17-19 (1)	07-08 (1) 08-10 (2) 10-13 (1) 18-21 (1)	05-07 (1) 18-20 (1) 05-07 (1)*
Far East	*Nil*	16-17 (1) 17-18 (2) 18-19 (1)	07-08 (1) 08-10 (2) 10-11 (1) 16-19 (1) 19-21 (2) 21-22 (1)	04-08 (1) 17-19 (1) 05-07 (1)* 17-18 (1)*
South Pacific & New Zealand	10-13 (1) 13-15 (2) 15-17 (1)	12-14 (1) 14-15 (2) 15-16 (3) 16-18 (2) 18-19 (1)	06-07 (1) 07-08 (2) 08-09 (3) 09-11 (2) 11-17 (1) 17-18 (2) 18-20 (3) 20-22 (2) 22-01 (1)	23-00 (1) 00-02 (2) 02-06 (3) 06-08 (2) 08-09 (1) 02-04 (1)* 04-06 (2)* 06-07 (1)*
Australasia	14-16 (1)	10-15 (1) 15-16 (2) 16-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-09 (2) 09-15 (1) 15-17 (2) 17-20 (1) 20-23 (2) 23-01 (1)	02-05 (1) 05-07 (2) 07-08 (1) 04-05 (1)* 05-07 (2)* 07-08 (1)*
Caribbean, Central America & Northern Countries of South America	08-09 (1) 09-10 (2) 10-12 (3) 12-13 (2) 13-15 (1)	07-08 (1) 08-09 (2) 09-14 (3) 14-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	00-06 (1) 06-07 (2) 07-09 (4) 09-11 (3) 11-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-22 (1) 22-00 (2)	18-19 (1) 19-21 (3) 21-03 (4) 03-05 (3) 05-06 (2) 06-07 (1) 19-21 (1)* 21-01 (2)* 01-04 (3)* 04-05 (2)* 05-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	09-11 (1) 11-16 (2) 16-17 (1)	07-08 (1) 08-10 (2) 10-13 (1) 13-14 (2) 14-16 (4) 16-17 (2) 17-18 (1)	06-07 (1) 07-09 (3) 09-10 (2) 10-14 (1) 14-16 (2) 16-18 (4) 18-19 (3) 19-20 (2) 20-22 (1) 22-00 (2) 00-02 (1)	20-22 (1) 22-04 (2) 04-06 (1) 21-23 (1)* 23-03 (2)* 03-04 (1)*
McMurdo Sound, Antarctica	*Nil*	08-10 (1) 13-15 (1) 15-16 (2) 16-17 (1)	16-18 (1) 18-19 (2) 19-21 (3) 21-23 (2) 23-00 (1) 06-08 (1)	03-06 (1)

Time Zones: CST & MST
(24-Hour Time)
CENTRAL USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	08-10 (1)	08-09 (1) 09-12 (2) 12-13 (1)	06-07 (1) 07-09 (2) 09-11 (1) 11-12 (2) 12-14 (3) 14-16 (2) 16-17 (1)	17-18 (1) 18-20 (3) 20-22 (2) 22-00 (1) 00-02 (2) 02-03 (1) 18-20 (1)* 20-00 (2)* 00-02 (1)*

Northern Europe & European USSR	08-10 (1)	08-11 (1)	06-07 (1) 07-12 (2) 12-14 (1)	18-19 (1) 19-21 (2) 21-23 (1) 23-00 (2) 00-01 (1) 19-00 (1)*
Eastern Mediter-ranean & Middle East	08-10 (1)	09-11 (1)	06-10 (1) 10-12 (2) 12-14 (3) 14-15 (2) 15-17 (1)	18-20 (1) 20-23 (2) 23-00 (1) 20-23 (1)*
Western Africa	09-10 (1) 10-12 (2) 12-13 (1)	07-10 (1) 10-11 (2) 11-13 (3) 13-14 (2) 14-15 (1)	06-12 (1) 12-14 (2) 14-15 (3) 15-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	18-19 (1) 19-23 (2) 23-00 (1) 19-23 (1)*
Eastern & Central Africa	09-12 (1)	08-11 (1) 11-13 (2) 13-14 (1)	07-14 (1) 14-15 (2) 15-17 (3) 17-18 (2) 18-19 (1) 21-23 (1)	20-00 (1) 21-23 (1)*
Southern Africa	09-10 (1) 10-12 (2) 12-13 (1)	07-10 (1) 10-11 (2) 11-12 (3) 12-13 (2) 13-14 (1)	07-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	18-19 (1) 19-22 (2) 22-23 (1) 19-22 (1)*
Central & South Asia	*Nil*	17-19 (1)	07-08 (1) 08-10 (2) 10-12 (1) 17-18 (1) 18-20 (2) 20-21 (1)	05-08 (1) 18-20 (1) 05-07 (1)* 18-20 (1)*
South-east Asia	*Nil*	14-16 (1) 16-18 (2) 18-19 (1)	07-08 (1) 08-10 (2) 10-14 (1) 18-19 (1) 19-21 (2) 21-22 (1)	04-07 (1) 17-19 (1) 05-07 (1)*
Far East	16-18 (1)	15-16 (1) 16-18 (2) 18-19 (1)	07-08 (1) 08-10 (3) 10-11 (2) 11-12 (1) 16-18 (1) 18-20 (2) 20-22 (1)	01-02 (1) 02-04 (2) 04-06 (1) 06-08 (2) 08-09 (1) 02-03 (1)* 03-05 (2)* 05-07 (1)*
South Pacific & New Zealand	11-13 (1) 13-16 (2) 16-18 (1)	10-14 (1) 14-16 (2) 16-18 (3) 18-19 (2) 19-20 (1)	06-07 (1) 07-09 (3) 09-12 (2) 12-17 (1) 17-18 (2) 18-20 (3) 20-22 (2) 22-00 (1)	23-01 (1) 01-02 (2) 02-07 (3) 07-08 (2) 08-09 (1) 00-02 (1)* 02-07 (2)* 07-08 (1)*
Austral-asia	14-16 (1) 16-17 (2) 17-18 (1)	10-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	05-07 (1) 07-08 (2) 08-10 (2) 10-11 (2) 11-15 (1) 15-17 (2) 17-19 (1) 19-20 (2) 20-22 (3) 22-00 (2) 00-02 (1)	02-04 (1) 04-08 (2) 08-09 (1) 03-04 (1)* 04-07 (2)* 07-08 (1)*
Carib-bean, Central America & Northern Countries of South America	08-09 (1) 09-11 (2) 11-13 (3) 13-14 (2) 14-15 (1)	07-08 (1) 08-09 (2) 09-14 (3) 14-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	00-06 (1) 06-07 (2) 07-09 (4) 09-11 (3) 11-13 (2) 13-15 (3) 15-18 (4) 18-19 (3) 19-20 (2) 20-22 (1) 22-00 (2)	18-19 (1) 19-20 (2) 20-21 (3) 21-03 (4) 03-05 (3) 05-07 (2) 07-08 (1) 19-21 (1)* 21-00 (2)* 00-03 (3)* 03-05 (2)* 05-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argen-tina, & Uruguay	09-11 (1) 11-15 (2) 15-16 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-15 (3) 15-16 (4) 16-17 (2) 17-18 (1)	00-07 (1) 07-09 (2) 09-14 (1) 14-16 (2) 16-18 (4) 18-19 (3) 19-20 (2) 20-22 (1) 22-00 (2)	19-21 (1) 21-01 (2) 01-03 (1) 03-05 (2) 05-06 (1) 21-23 (1)* 23-01 (2)* 01-03 (1)*
McMurdo Sound, Antarctica	*Nil*	07-09 (1) 13-15 (1) 15-17 (2) 17-18 (1)	06-08 (1) 15-17 (1) 17-19 (2) 19-22 (3) 22-00 (2) 00-01 (1)	03-06 (1)

Time Zone: PST (24-Hour Time)
WESTERN USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	08-10 (1)	07-08 (1) 08-10 (2) 10-12 (1)	06-07 (1) 07-09 (2) 09-10 (1) 10-14 (2) 14-16 (1) 23-01 (1)	18-20 (1) 20-22 (2) 22-00 (1) 19-23 (1)*
Northern Europe & European USSR	*Nil*	07-10 (1)	06-07 (1) 07-11 (2) 11-13 (1) 23-01 (1)	21-00 (1) 21-23 (1)*
Eastern Mediter-ranean & Middle East	*Nil*	07-10 (1)	06-07 (1) 07-09 (2) 09-11 (1) 11-13 (2) 13-15 (1) 21-23 (1)	18-22 (1) 06-08 (1)
Western Africa	09-11 (1)	08-10 (1) 10-11 (2) 11-12 (3) 12-13 (2) 13-14 (1)	07-10 (1) 10-14 (2) 14-16 (3) 16-17 (2) 17-18 (1) 22-00 (1)	18-23 (1) 19-22 (1)*
Eastern & Central Africa	*Nil*	09-12 (1)	06-09 (1) 11-13 (1) 13-16 (2) 16-18 (1) 21-23 (1)	18-21 (1) 06-08 (1)
Southern Africa	08-12 (1)	08-10 (1) 10-13 (2) 13-14 (1)	07-09 (1) 11-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1) 23-01 (1)	18-19 (1) 19-20 (2) 20-21 (1) 06-08 (1) 18-20 (1)*
Central & South Asia	*Nil*	17-19 (1)	07-08 (1) 08-09 (2) 09-11 (1) 16-17 (1) 17-18 (2) 18-19 (1)	04-06 (1) 06-08 (2) 08-09 (1) 05-07 (1)*
South-east Asia	15-17 (1)	14-15 (1) 15-17 (2) 17-18 (1)	07-08 (1) 08-10 (2) 10-12 (1) 17-19 (1) 19-20 (2) 20-22 (1)	02-03 (1) 03-06 (2) 06-08 (1) 03-07 (1)*
Far East	14-16 (1)	13-14 (1) 14-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	07-08 (1) 08-10 (3) 10-12 (2) 12-16 (1) 16-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	22-00 (1) 00-02 (2) 02-07 (3) 07-08 (2) 08-09 (1) 23-01 (1)* 01-05 (2)* 05-07 (1)*
South Pacific & New Zealand	10-12 (1) 12-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	09-12 (1) 12-15 (2) 15-17 (4) 17-18 (2) 18-19 (1)	04-07 (1) 07-09 (3) 09-12 (2) 12-16 (1) 16-17 (2) 17-18 (3) 18-20 (4) 20-22 (2) 22-02 (1) 02-04 (2)	21-22 (1) 22-05 (3) 05-08 (2) 08-09 (1) 22-00 (1)* 00-06 (2)* 06-07 (1)*
Austral-asia	13-15 (1) 15-17 (2) 17-18 (1)	11-12 (1) 12-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	12-17 (1) 17-19 (2) 19-21 (3) 21-22 (2) 22-03 (1) 03-05 (2) 05-07 (1) 07-10 (3) 10-12 (2)	02-03 (1) 03-04 (2) 04-07 (3) 07-08 (2) 08-09 (1) 03-04 (1)* 04-07 (2)* 07-08 (1)*
Carib-bean, Central America & Northern Countries of South America	08-09 (1) 09-10 (2) 10-13 (3) 13-14 (2) 14-15 (1)	07-08 (1) 08-11 (2) 11-13 (3) 13-15 (4) 15-16 (2) 16-17 (1)	00-05 (1) 05-06 (2) 06-08 (3) 08-09 (4) 09-10 (3) 10-13 (2) 13-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-22 (1) 22-00 (2)	18-19 (1) 19-20 (2) 20-03 (3) 03-04 (2) 04-06 (1) 19-22 (1)* 22-02 (2)* 02-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argen-tina & Uruguay	09-10 (1) 10-12 (2) 12-14 (3) 14-15 (2) 15-16 (1)	07-08 (1) 08-09 (2) 09-13 (1) 13-14 (2) 14-15 (4) 15-16 (3) 16-17 (1)	01-06 (1) 06-09 (2) 09-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-22 (1) 22-01 (2)	19-21 (1) 21-03 (2) 03-05 (1) 20-23 (1)* 23-01 (2)* 01-02 (1)*
McMurdo Sound, Antarctica	13-15 (1)	08-10 (1) 13-15 (1) 15-16 (2) 16-18 (1)	07-09 (1) 17-19 (1) 19-20 (2) 20-22 (3) 22-00 (2) 00-02 (1)	23-02 (1) 02-05 (2) 05-06 (1) 02-05 (1)*

*Indicates best time to listen for 80 Meter openings. Openings on 160 Meters are also likely to occur during those times when 80 Meter openings are shown with a propagation index of (2), or higher.

Spread The Word

An eye-catching bumper sticker encouraging the man in the street to "Talk to the World - Become A Ham Operator" is available from CQ for 25 cents plus a legal-size s.a.s.e. Quantity prices upon request. Write to: CQ, 14 Vanderventer Ave., Port Washington, NY 11050.

a monthly feature by

IRWIN MATH, WA2NDM

Math's Notes

A look at the technical side of things

Recently, we received some requests for information on the application of solid state devices such as SCR's and Triacs to power switching applications. As a result, we will devote this column to a.c. applications of triacs, and next month to SCR's.

The triac, shown schematically in fig. 1, is a Thyriston that has a unique characteristic. When a.c. voltage is applied across the device as shown in fig. 1, it does not conduct. When the gate lead is pulsed momentarily however, the triac does conduct and remain conducting until the applied voltage is removed or goes to zero. The only requirement of the trigger pulses is that they be of the same polarity as the a.c. In other words, if the MT_1 terminal is positive going (remember a.c. is bipolar) the trigger pulses must be positive. If it is negative, the pulses must be negative going.

With this thought in mind let us look at fig. 2. This is a schematic of a simple, a.c. line operated switch that can control large amounts of power depending on the triac selected. The control element is an inexpensive, low power reed relay. With the relay open, the triac is cut off and no power is applied to the load. When the relay closes however, the gate is always at the proper main voltage polarity and the load is energized. With this ultra simple circuit, and a Motorola MAC11-4 triac, for example, 10 amperes of current can be switched with ease. In fact, if a low power reed relay is used with the circuit, even digital logic elements could be used to control the triac.

It should be pointed out that the choice of a triac in this circuit is dependent on two main considerations — the peak cutoff voltage, and the maximum conducting current. For a 115 volt line, 200v PIV triacs are usually employed and for a 220 volt line, 400 PIV devices are used. Other parameters are usually not too important in this type of circuit.

*5 Melville Lane, Great Neck, NY 11020

It should be pointed out that you do not have to use a reed relay as a control element. Any switch could be used but since the current flowing is very low, small switches could be used even if the main current is as high as 20 amperes. Also, the resistor and capacitor shown in dotted lines are important where the load is a inductive, such as a transformer. They serve to limit the rate of rise of voltage across the triac to a valve that will prevent false operation.

As we initially stated, the triac goes into conduction at the exact moment that the trigger pulse occurs. With this fact in mind, we can now see that by making the trigger pulse occur at some point during the a.c. cycle—we can vary the actual a.c. power applied to the load. Fig. 3 should clarify this statement. Here we have the basic triac circuit on the left, and a simple network on the right. The pot and .2 μF capacitor form an RC time delay circuit in that the capacitor charges through the pot and at a speed that is a function of the value of the pot. At maximum resistance, it takes longer to charge and at minimum resistance it charges very rapidly. The trigger diode is a device that does not conduct until a certain critical voltage is reached. At that point, it suddenly conducts. What happens in the circuit therefore may be inferred from the wave shape shown. As the a.c. input rises from 0 to its maximum positive valve, the voltage across the capacitor also rises. At some point, the critical voltage of the trigger diode is reached. Now the diode conducts, causing the triac to turn on, and the load is energized. As shown in the example however only half of the remaining half cycle of a.c. is left to be applied to the load and the average load voltage is consequently less. The same thing happens on the negative half cycle with the result that the total average voltage to the load is diminished.

Now by varying the pot, the rate of charge can be varied so that the

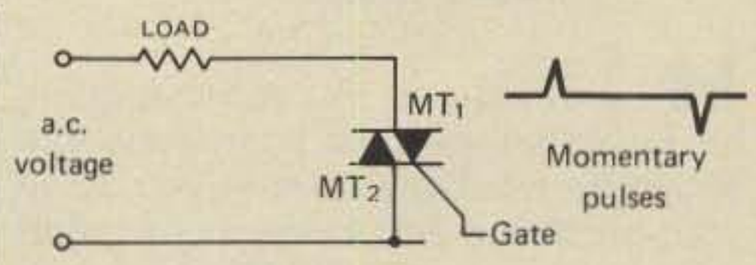


Fig. 1—The basic triac circuit.

triac conducts earlier or later in the cycle and a complete control is the result. This type of operation is called phase control. Applications are many. The device may be used to produce a variable output a.c. supply by using a transformer as the load. A d.c. supply would simply require rectifiers and filter capacitors after the transformer. By using the lamp as a load,

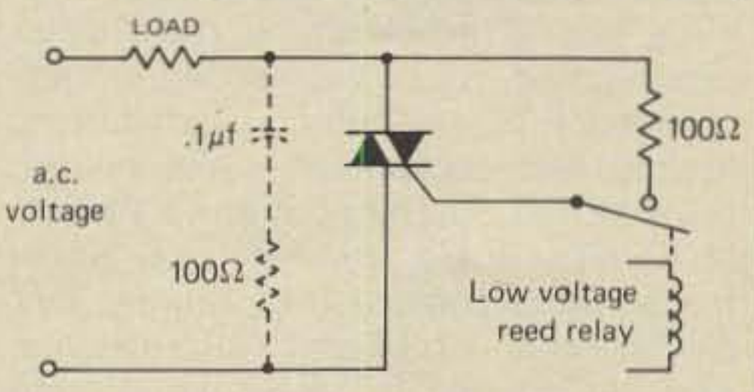


Fig. 2—A simple triac a.c. line switch. The components in the dotted lines are for use with inductive loads such as transformers.

you have a light dimmer, etc. The only reservation is that the waveshape is not sinusoidal and may cause problems with some types of equipment. Resistive loads (lamps for example) will work fine however,

(Continued on page 88)

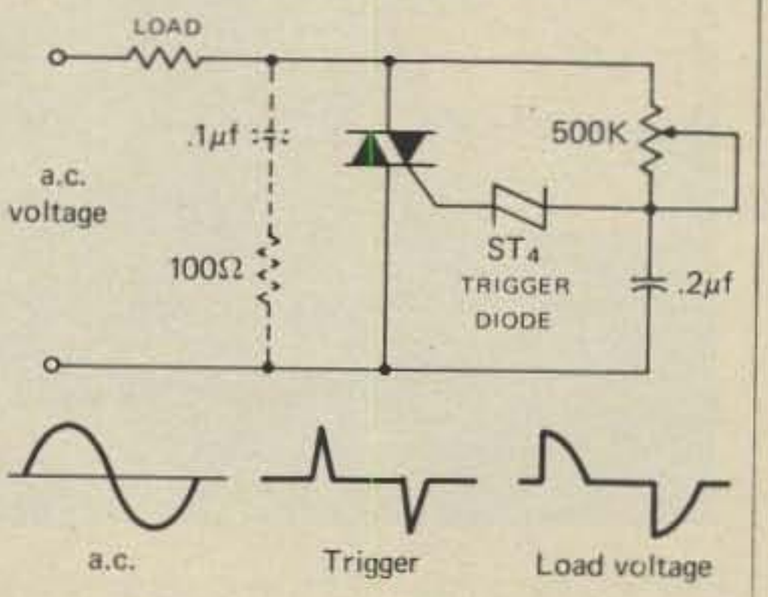


Fig. 3—A simple triac power supply.

a monthly feature by

BILL WELSH, W6DDB

Novice

"How to" for the newcomer to Amateur radio

Getting Technical Help from Experts

How would you like to have some of this country's most knowledgeable amateurs available to help you solve your problems and to teach you what they know about everything associated with the amateur radio service? I have good news for you; this aid is available right now to help you learn all you want to know about such subjects as antennas, awards, contests, DX, electronic/radio theory, equipment modifications, equipment/accessory reviews, grounds, keying/break-in/control circuits, keys/keyers, mobile, modulation (a.m./d.s.b./f.m./n.b.f.m./p.m./s.s.b.), operating, Oscar/satellites, portable, power supplies/filters, radioteletype, radio wave propagation, receivers/receiving, regulations/FCC, station installation, testing/test equipment, transceivers, transistors / semiconductors / FETs / MOSFETs/SCRs, transmission lines, transmitters/transmitting, tuners, TV/SSTV, and v.h.f./u.h.f./microwaves. The key to this fantastic warehouse of knowledge is simply learning to use indexes printed in the four major American Amateur Radio magazines (*CQ*, *Ham Radio*, *QST*, and *73*). You can truly pick the brains of some top past and present amateurs by reading what they wrote in articles printed in amateur magazines. I am not telling you to throw out your license manuals and theory reference books. I am just pointing out that magazine articles provide in-depth coverage of subjects and presents it in an interesting manner. We all experience dissatisfaction with our understanding of some subjects, no matter how well it has been presented in text books. When this happens, look up related magazine articles and do some reading to clear away the mysteries. You probably already realize that some people write to impress readers whereas others write to get the information across to those who need it. If you haven't already developed a knack for extracting good information from an assortment of articles, you will quickly develop this required ability. Naturally, newer magazines contain more useful information to help you understand amateur radio as it exists today. However, you will find that some articles in older issues are still very helpful, despite their age. Some magazine articles are good enough to duplicate and to retain for future reference use. I have found that certain articles and series of articles continue to help whenever I need to refresh my understanding of particular subjects.

If you are preparing yourself to take the FCC Novice examination, you will be pleasantly surprised by how much helpful material you will find in existing amateur magazines.

If you are getting ready to install your first station, you should read about antennas, receivers, transmitters, transceivers, keys, keyers, transmission lines, headphones, control circuits, and grounds. Your study and proper preparation can help you install a very good initial station which will be pleasant to operate. It has been my experience that most equipment and accessory reviews fail to honestly state where units fall short of desired performance. Nevertheless, even these reviews are some help if you use them to compare differences between the available items. If you already have your station in operation, you should be able to improve it by using tips extracted from amateur magazines.

While you are increasing your code proficiency by operating in the Novice bands, you can easily increase your knowledge of theory and FCC regulations by reading appropriate articles. It requires a major effort to upgrade from the Novice to a renewable FCC license but good explanations can make it interesting to learn. It is possible that you will read information in one article and understand it well, whereas you may have read the same material in another article and failed to understand what you read. We all find that we have our own peculiarities and that we are more in tune with some writing styles than others.

Once one upgrades to a renewable FCC amateur license, it is natural to want to experiment in one or more specialized fields of interest in ama-

2814 Empire Ave., Burbank, California 91504.

Here is Lynda Paul, WB1CWK, assembling her Heathkit HW-101 transceiver. Lynda became a Novice licensee in April 1977.

teur radio. You may become interested in radioteletype, slow-scan TV, TV, v.h.f./u.h.f., contests, DX, certificate hunting, or any of the other amateur activities. There are many text books to help you learn the fundamentals but you will probably find that magazine articles do the best job of breaking things down to where they are easy to understand.

It often comes to my attention that both beginning and experienced amateurs do not take advantage of the excellent information printed in amateur magazines. The next time you need help to solve any problem, try finding the information you want in amateur magazines. I think you will be pleasantly surprised with the good results of some research. Some of our country's top communications and electronics experts are amateurs and many of them write magazine articles to share their knowledge with their fellow amateurs. It makes good sense to take full advantage of this unique amateur radio resource.

If the preceding information has convinced you to use amateur magazines as a stepping stone to more knowledge, you need to know how to find articles on specific subjects. It is far too time consuming to leaf through every page of magazines to find desired information. It is much faster and easier to glance through the index printed in the December issues of most magazines each year. *73* Magazine seldom has a December index and this forces us to spend a bit more time researching these issues. It takes a little effort to locate desired material because it is not necessarily listed under the same heading in all four magazines. However, subject headings remain fairly constant from one year to the next of the same magazine. Differences between subject headings are not a major obstacle in using these magazines. You will have to do a little hunting from one magazine to another to locate the same information, but the headings are reasonable and your searches will be rewarded with success.

Cumulative indexes are occasionally printed by magazine publishers and these provide keys to many useful articles. It is much easier to assemble a set of cumulative indexes than it is to gather indexes for each individual year. *Ham Radio* Magazine published a cumulative index in their December 1976 issue which covers all of their issues from the magazine's 1968 beginning up through the end of 1976. *QST* Magazine's cumulative index has been published for the years 1950-1962.

It may be possible to obtain desired sets of indexes directly from the magazine publishers, if you explain your intended use of this material. The addresses of the four major American amateur radio magazines are listed herein for your convenience:

CQ, The Radio Amateurs' Journal
14 Vanderventer Avenue
Port Washington, Long Island,
New York 11050

Ham Radio Magazine
Greenville, New Hampshire 03048

QST Magazine
American Radio Relay League, Inc.
225 Main Street
Newington, Connecticut 06111

73 Magazine
Peterborough
New Hampshire 03458

If all else fails, you can request a specific index from me and I will send you a copy of my reference set within two weeks. Please exhaust all other sources before writing to me because I have no convenient way to process such requests. Nevertheless, I am willing to help if you are unable to obtain what you need elsewhere, so don't hesitate to write. If you need an index please include a note stating which year and which magazine are involved. It is also necessary to enclose a number ten (4 by 9.5 inches) self-addressed envelope with double postage (24¢) attached.

Another way to gather a set of indexes, plus a partial set of reference magazines, is to buy copies of December issues from either magazine publishers or those who advertise them in the "for sale" sections of these magazines. Costs of these magazines vary considerably and one must be careful in selecting a supplier. It is best to try a small order first and you can expand future magazine orders once a source has proven to be dependable. I have helped run a used magazine service for more than a decade and it has been greatly appreciated by individuals and organizations in every state, plus in about 30 countries. This type of effort is conducted as a service to the amateur radio fraternity and the free ad in *CQ* helps us ship 300 to 3000 issues per month. It is more expensive to collect a set of December issues but this system has the advantage that you will have about eight percent of the referenced articles in your December issues.

Frankly, it is too expensive and it takes too much room for an average amateur to maintain a reasonably complete set of reference magazines. It is better to have local amateur radio clubs and public libraries stock and control amateur magazines. Check to find out whether or not these groups stock magazines in your area. If they have these magazines, make lists of which ones they have. If neither group has a reference set of magazines, urge your local amateur radio club(s) to establish sets at their location, in local public libraries, or at both places. I have found that our local public, college, and high school libraries are very pleased to have a good reference set of amateur magazines, if they can be obtained at no cost to the libraries. If nothing else, at least get your club to buy magazine subscriptions to start getting current issues into your library. If you can get an agreement that your public library will stock and loan magazines, you could help a lot of other amateurs by running a drive to obtain these magazines for your library. Any good amateur radio club could provide a fairly complete set of these magazines to a library by just mounting a drive among its members. Very few libraries can boast adequate supplies of amateur radio magazines or text books.

If your amateur radio club has the space to store them, urge its members to gather and maintain a set of amateur radio magazines. Most clubs do not have enough room and a workable solution to this problem is to have each of four members be responsible for one of the reference sets of magazines. This is the type of thing that clubs are uniquely able to accomplish without major expenditure of either effort or money.

There are individual amateurs who have extensive collections of these magazines. You may be fortunate enough to find someone like this in your area. If so, explain your need and make it very clear that you will return each borrowed issue on time and undamaged. These collectors are understandably protective of their issues and you must convince them of your concern for their magazines if you are to have any chance to borrow issues. Try to make an arrangement which limits both the number of magazines borrowed at one time and how long they will be gone from the owner's collection. I think a reasonable maximum is six issues and that magazines should be returned within a week. It is easy to duplicate pages which contain data you want for future reference purposes. Duplicating machines are in many post offices and stationery stores.

The percentage of Novices who upgrade to at least the General license has always been low. The recent upsurge in Novice licensing courses does not appear to be matched with anything close to a matching increase in General licensing courses.

(Continued on page 88)

a monthly feature by
JOHN A. ATTAWAY, K4IIF

DX

News of communications around the world

Summer is over, the tang of autumn is in the air and it's time to get the antennas in shape for the fall and winter DX season. This is particularly true if you live in the northern climes where snow and ice will be the rule in a few weeks. Here in Florida its the reverse, we do our tower climbing in the winter and avoid it like the plague during the summer heat and thunderstorm season.

Let us call your particular attention this month to two other feature columns in *CQ*. These are the propagation column by George Jacobs, W3ASK, and the contest column by Frank Anzalone, W1WY. George does a great job keeping you advised re. band openings and Frank does an equally good job on contests. Both Frank and George are veterans of a quarter century with *CQ*, and are widely regarded as the world's leading specialists in their respective fields.

Late this month, Oct. 29-30, is the CQ Worldwide Phone Contest weekend. As this is the best weekend of the entire year to work DX in the voice bands, now is an exceptionally good time to see what George and Frank have to say.

DX Hall of Fame

It gives us great pleasure to announce that the CQ DX Award's Advisory Committee has elected Geoff Watts of Norwich, England, editor and publisher of the *DX News-Sheet*, to the DX Hall of Fame.

Geoff Watts, Editor and Publisher of the DX News-Sheet, *and the latest inductee into the DX Hall of Fame. Geoff has always been "camera-shy" and this is the first time his photo has appeared in an amateur radio publication.*

For the past 16 years, Geoff Watts has devoted the lion's share of his waking hours to the singular goal of keeping the world's DXers completely informed regarding all major events from 10 to 160 meters. He has been a good and faithful friend to all DXers the world over.

Since the inception of the *DX News-Sheet*, Geoff has published and circulated over 750 issues to some 1,250 subscribers in every corner of the world. The nominal cost of a subscription has been so low that we hope he has been able to break even.

In a letter written to the DX Editor, K4IIF, a year ago, Geoff indicated that in a typical week he was spending 72-80 hours compiling and arranging information for the *News-Sheet*, typing stencils, printing, enveloping, stamping and labeling 1,250 envelopes plus answering an average of 30 letters per day, which the publication received. In addition, Geoff is also the father and manager of the popular Islands-On-The-Air award program.

One of Geoff's most interesting challenges has been the processing of subscriptions paid in 20 different currencies, including all the various kinds of foreign checks, money-orders and bank drafts. The *DX News-Sheet* and the Foreign Currency Department of Geoff's local bank have become very well acquainted.

In late 1976, Geoff's physican advised him to reduce his work load or face loss of his eyesight and a possible coronary. Consequently, he now limits the circulation of the publication to U.K. subscribers. Just prior to this decision his circulation list included slightly over 100 countries, but during the prior 15 years he had regular readers in a total of

*P.O. Box 205, Winter Haven, FL 33880.

Left to right are Dale Jones, K5MM/W7NQ and Bill Snider, K6KM, licensee of EP2SV and 9D5A. The photo was made in Tehran. (Tnx K5MM/W7NQ).

The CQ DX Awards Program

S.S.B.

512...WB2SFF

C.W.

270...GW3CBA

S.S.B. Endorsements

310...W9JT
300...K6XP
300...XE1KS
150...WA3YYW
3.5/7 MHz...XE1KS
28 MHz...XE1KS
QRPp...W8ILC*
*100 countries

C.W. Endorsements

150...K8PYD

Complete rules and application forms for the CQ DX awards program can be obtained by sending a business size, No. 10, envelope, self-addressed and stamped to: "CQ DX Awards," 5632 47th Avenue S.W., Seattle, Washington 98136 U.S.A.

Gunther Hartmann, DL6KC, is another outstanding German DXer. His c.w.-phone WAZ is number 3976. The photo shows an excellent example of a neat and compact operating position.

One of the latest novice DXers to receive CQ's WPNX Award is Joe Attaway, WA4RVC, son of CQ DX Editor K4IIF and a freshman at Duke University. Joe's prefix total was racked up using Ten Tec's Triton IV and a straight key. He finds that Triton's full break-in feature is tops for c.w. DX. The WPNX Award is the only major DX award for novice's only. If interested, write K4IIF or K6XP for an application.

190 DX countries. His 'star' subscriber is King Hussein of Jordan.

As a result of Geoff's desire to reduce his work load it is possible that the Radio Society of Great Britain may assume responsibility for the Islands-On-The-Air awards. However, at press time we have not heard of a definite decision.

Although a short-wave listener, Geoff Watts has been an avid DXer since he became BRS-3129 in 1937. He was the first G-SWL to confirm all 40 zones, the first G-SWL to confirm 300 countries and he hopes one day to log his only remaining country, Clipperton Island.

At press time, the presentation of Geoff's DX Hall of Fame plaque is being arranged by Dr. John Allaway, G3FKM; Mr. Roy Stevens, G2BVN; and Mr. John Bazley, G3HCT. These 3 distinguished gentlemen have all served the RSGB in many capacities. G3FKM is outgoing president, editor of the DX column for *Radio Communication* and maintains the official CQ Award's checkpoint in the United Kingdom.

Congratulations to a very dedicated servant of DXers everywhere —Geoff Watts, DX HALL OF FAME!

The DX Hall of Fame

Gus M. Browning, W4BPD
Nov. 1, 1967
John M. Cummings, W3CTN
March 23, 1968
Stewart S. Perry, W1BB
Aug. 16, 1968
Richard C. Spenceley, KV4AA
March 1, 1969
Danny Weil, VP2VB
Sept. 15, 1969
H. Dale Strieter, W4DQS
May 23, 1970
Stuart Meyer, W2GHK
Oct. 31, 1970
Martin Laine, OH2BH
Jan. 22, 1972
C. J. (Joe) Hiller, W4OPM
March 30, 1973
Ernst Krenkel, RAEM
April 14, 1974
Frank Anzalone, W1WY
June 19, 1976
Lloyd and Iris Colvin, W6KG & W6QL
Nov. 12, 1976
Geoff Watts, Editor & Publisher
June 11, 1977

CQ DX Honor Roll

The *CQ* DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more countries for the mode indicated. The top SSTV DXers are also listed. The ARRL DXCC Country List, LESS DELETED COUNTRIES, is usd as the country standard. Total number of current countries on the DXCC list as of this listing is 319. Honor Roll listing is automatic when submitting application or endorsement for 275 or more countries. To remain on the CQ DX Honor Roll, annual updates are required. Honor Roll updates may be submitted anytime.

C.W.

W6PT 319	W4YWX 308	W4IC 301	K6JG 297	W6NJU 284
K6EC 316	W2GT 307	W6ISQ 301	N6FX 297	WA6EPQ 282
ON4QX 314	W8LY 305	K6LEB 298	W4BQY 296	K9MM 279
W6ID 312	W9DWQ 304	WØAUB 298	VK3AHQ 292	DJ7CX 276
W8KPL 309	N6AV 302	DL3RK 297	WA8DXA 287	

S.S.B.

W2TP 318	F9RM 311	K6WR 304	G3DO 296	W6FET 287
DL9OH 316	I8AA 311	K6YRA 303	G3TJW 296	G3RWQ 286
K2FL 316	IT9JT 310	VE2WY 303	HP1JC 296	K1KNQ 286
WA2RAU 316	K4RTA 310	VE3GMT 303	N6AV 296	W6HUR 286
TI2HP 315	W3DJZ 310	WA3IKK 303	OZ3SK 296	DJ7CX 285
W4EEE 315	W6KTE 310	K4MQG 302	WØSFU 296	OE3WWB ...285
G3FKM 314	K6JG 309	ZL1AGO 302	W2CNQ 295	G3KYF 284
IØAMU 314	K8DYZ 309	K9LKA 301	N4MM 294	N6FX 284
W3CWG 314	SM6CKS 309	OE2EGL 301	DJ9ZB 293	N6AW 282
W3NKM 314	SM6CWK 309	W6NJU 301	I5WT 293	WB2RLK 282
W6RKP 314	WA2EOQ 309	XE1KS 301	VE7WJ 293	YV1LA 282
W9DWQ 314	F2MO 308	ZS6LW 301	K6AQV 292	SP5BSV 281
XE1AE 314	K6EC 308	K6XP 300	K8PYD 292	WA4WTG ...281
VE3MJ 313	W4DPS 308	W3GG 300	WA2HSX 292	WAØKDI 281
VE3MR 313	W6YMV 308	I4ZSQ 299	VE7CE 291	XE2YP 281
W3AZD 313	WA6AHF 308	VE3GCO 299	WØYDB 291	N2SS 280
W6EL 313	I8YRK 307	W6KZS 299	W9YRA 290	W9QQ 280
W9ILW 313	IØZV 307	W9OHH 299	DL6KG 289	DL1MD 279
W9JT 313	K9WEH 307	YV1KZ 299	G3WW 289	K4SB 279
I8KDB 312	ZL3NS 307	EA4LH 298	OE1FF 289	OK1MP 279
W2QK 312	I6FLD 306	W9QLD 298	W6FW 289	WB4SIJ 279
W4SSU 312	SM5SB 306	WØSD 298	K4HJE 288	VE7HP 277
W4UG 312	W9KRU 306	WB6DXU 298	YS1O 288	W7OM 277
W6EUF 312	KH6BB 305	F9MS 297	DK2BI 287	K8LJQ 275
W6REH 312	W4IC 305			

SSTV

W8YEK 108

Address Change for W3HNK

Super QSL Manager, Joe Arcure, Jr., W3HNK, relocated last spring. As some cards are still going to Joe's old address, here is his new QTH for the 100+ DX stations which he handles:

Mr. Joe Arcure, Jr., W3HNK
P.O. Box 73
Edgemont, PA 19028

Stew, W1BB, sends these photos of an OM/XYL 160 meter DX team from Czechoslovakia. OM Ludek, OK1HAS has 36 countries while XYL Dagmar has 32, and they only run 10 watts!

Edgar Obletter, I3OBO, of Verona, Italy is another recent winner of CQ's WAZ Award. Ed uses Drake equipment to a 3-element Yagi.

Stations recently added to the list which Joe manages are: VP2VDQ, VP2LDI, 8P6IJ, ZP5AL, ZP5AN, ZP-5AO, ZP5CBL, ZP5EC, ZP5EF, ZP5-KB, ZP5LX, ZP5PT, ZP5PX, ZP5WU, ZP5YD and ZP5RL.

Would You Like To Be A QSL Manager?

If you would like to handle cards for a DX station, send us your name and address and we will print it in a special column so that the overseas and DXpedition stations will be aware of your interest. The DX Department has done this several times over the years and several, long-lasting DX-QSL Manager relationships have resulted.

De Extra

Neighborhood Flack: If you're a DXer you probably have a higher tower, a more conspicuous beam, and unless you're a disciple of Adrian Weiss, you run a bit more power than the average amateur. Unfortunately, though these are positive attributes to your fellow amateurs, they make you a prime candidate for "neighborhood flack," an insidious social disease sweeping the country in the wake of several million CBers. As a result of "neighborhood flack", 47 states have enacted laws subjecting amateurs and CBers to civil and criminal penalties for TVI/RFI, and we are told that all 50 states are considering zoning laws which would limit amateur towers to a height of no more than 25 feet.

We have heard of cases of "neighborhood flack" which are out and out horror stories. Local governments have come down on amateurs with both feet, preventing the erection of towers and forcing the removal of existing towers, threatening fines and all manner of legal harassment designed to make life downright unpleasant. In at least 7 states, courts have either fined amateur or CB operators for TVI, or have put them off the air until no possibility exists of interference from their equipment. In 1976 alone, there were approximately 7,000 legal matters involving personal communications.

The DX Editor had some personal experiences with "neighborhood flack" about 10 years ago. They were mild compared to the troubles some amateurs have suffered, but as they are typical of what can happen to you we'll relate some of the details.

At that time we had a 70 ft., guyed tower with stacked 40 and 20 meter beams, and with our flat Florida terrain it was noticeable for quite some distance. The nearest TV station was over 50 miles from our 1960's QTH and had a weak signal into the area. It became fashionable to blame us whenever the picture was less than perfect. One close neighbor had a 2-bay conical antenna no more than 10 feet off the ground, and his favorite stations were Channel 6 at a distance of 60 miles and Channel 2 at a distance of 80 miles. It didn't take much of a harmony on 15 meters to cause some interference, and we grew to dread the ringing of the telephone during a DX contest.

Needless to say, we checked out our equipment to the 'nth degree. We put lowpass filters on every exciter and linear and grounded everything to 30 ft. copper rods which split the hardpan to ground-water. We offered to put high pass filters

The WAZ Program

Single Band WAZ

20 Meter Phone

50...WBØNHG
51...JH6HPL
52...VE3AKG
53...VE3II

S.S.B. WAZ

1382...WBØNHG
1383...JH1LKO
1384...JE1XHN
1385...VE3AKG
1386...WA7GVM

C.W.—Phone WAZ

4107...KL7HIK
4108...JA2PSV
4109...F6COU
4110...WAØTAS
4111...WB9CGL
4112...W4LVM
4113...K6CBL
4114...JA7JW
4115...WA2CBB
4116...W7DV
4117...VE3AKG
4118...OK2BKR
4119...OZ2E
4120...JA1JKW

Phone WAZ

529...W8CFG
530...VE3AKG

The complete rules for all WAZ awards are found in the May, 1976 issue of CQ. Application blanks and reprints of the rules may be obtained by sending a self-addressed, stamped envelope to the DX Editor, P.O. Box 205, Winter Haven, FL 33880.

Al Sass, VE3AS, of Paris, Ontario. Al was one of K4IIF's contacts from TF3IRA during his 1975 visit to Iceland. Al has successfully applied for the WAZ award.

Len Kaufer, KG6SW, recently worked Egypt for Zone 34 and WAZ from the western Pacific. Zone 34 is a toughie from Len's part of the world. His QTH is excellent for DX, being 1100 ft. up in the center of Saipan overlooking the confluence of the Pacific Ocean and Philippine Sea. Over the past 6 years, Len has confirmed over 18,000 Saipan contacts via his QSL Manager, Rod Linkous, W7YBX, Assistant DX Editor of CQ. (Photo courtesy of Pedro S. Tenorio).

The WPX Program new certificates

Mixed

580...PY4OD
581...YU2CQ
582...YU1NGO
583...DL7AA
584...W3YI
585...HA5KDW
586...WA2LJM
587...N2GG

S.S.B.

984...PY4OD
985...K8EHD

C.W.

1604...ON6QX
1605...JA7JW
1606...YU5FAM
1607...DM3XM
1608...I1LDX
1609...JR3ODV
1610...IØWLS

WPNX

98...WB8ZRL
99...WB2IMX
100...WA4ZXC
101...WB7CLU

VPX

127...DM-4043/L

Endorsements

Mixed: 1407 YU2DX, 1320 W4BQY, 1005 DL7AA, 770 PY4OD, 708 JH1VRQ, 700 4X4FU, 675 YU1NGO, 668 VE7DP, 650 SM4-3434, 550 HI8MOG, 504 YU2-CQ, 500 HA5KDW, 420 N2GG, 400 W3YI, WA2LJM.
SSB: 766 OK3EA, 750 WA1JMP, 488 PY4OD, 301 K8EHD.
CW: 923 OK3JW, 850 OK3EA, 755 OK2BLG, 750 VE-1MF, 650 WA1JMP, PY4OD, 600 K9WA, 550 OK1-DKR, 508 K9HLW, 453 VE3HLC, 400 JH1VRQ, 378 JA7JW, 362 I0WLS, 327 JR3ODV, 310 YU5FAM, 308 I1LDX, 304 ON6QX.
15 Meters: YU1NGO, DL-R15-150947.
20 Meters: YU1NGO, DL-R15-150947, OK3IF.
80 Meters: YU1NGO, DL-R15-150947.
160 Meters: DL-R15-150947, OE1TKW.
Africa: DL7AA.
Asia: VE7DP, OK3JW, DL7AA, KDX1A, JR3ODV.
Europe: VE7DP, DL7AA, YU5FAM, JR3ODV, WA2LJM.
No. America: VE7DP, OK3JW, DL7AA, DL-R15-150-947, WA2LJM.
Oceania: VE7DP, DL7AA.
So. America: DL7AA.

Complete rules for WPX can be found in the May, 1976 issue of *CQ* Magazine. Application forms may be obtained by sending a business size, self-addressed envelope to "CQ WPX AWARDS", 5014 Mindora Dr., Torrance, CA 90505, U.S.A.

on the offended TV sets. We explained amateur radio and the technical nature of interference. We showed our own TV set working beautifully while the rig was running a full gallon. Unfortunately, the result was worse than predictable. The high pass filters were refused as "our TV set has worked fine since 1955 and there isn't anything wrong with it. The trouble is that you aren't satisfied with the amateur bands, you've got to transmit in the middle of Channel 6. If you go back to the amateur frequencies where you belong, the problem will be solved."

We offered to observe quiet hours during their favorite programs, but were told that "they had the right to watch TV 24 hours a day and we could darn well stay off the air if we didn't know how to operate our equipment." Things finally degenerated to the point of visits from the local sheriff and other such assorted pleasantries. It was finally put to rest by the establishment of a local cable TV company. Believe me, we are all for cable TV, especially in a fringe area.

Unfortunately, things don't always work out this well. Other amateurs have had to fight the full wrath of their local authorities without any help. That's a tough spot to be in and it's very lonely. Fortunately there is now some place to turn for advice and encouragement. It's called the *Personal Communications Foundation.*

The *Personal Communications Foundation* is a nonprofit organization committed to making information available to attorneys involved in TVI/RFI cases. It can be a great help to amateurs and their lawyers if they are aware of its existence and if it receives adequate funding. We understand that the A.R.R.L. has approved $5,000. to support the *Foundation* so we assume that it has been investigated and found to be a valid, on-going organization.

Membership applications for the *Personal Communications Foundation* may be obtained from its Executive Director, Mr. Carl Markov, Esq., 915 West Lancaster Boulevard, Lancaster, California 93534, phone (805) 942-0144.

Prefix News

A51—A51RG, operated from Thimphu, Bhutan by Rinchhen Gyeltshem, is said to be active occasionally, but not often.

CG1—From July 20-Aug. 2, 1977, special station CG1CR was operated on 80—2 meters from Cape Breton Island by the Sydney Amateur Radio Club. A special commemorative QSL is available through VE1ABM.

FRØ—Reunion Island was activated in July by FM7WØ signing FRØDGP. QSL to K5KEZ.

GE—English stations used the special prefix GE from June 4-June

(Continued from page 88)

G. C. Nielsen, OZ8CN, of Odense, Denmark is the latest to apply for WAZ through CQ's OZ checkpoint. The DX Editor visited Odense last year and can attest to the fact that it is a beauiful city.

a monthly feature by

A. EDWARD HOPPER, W2GT

Awards

News of certificate and award collecting

The "Story of The Month" for October came through the courtesy of Bill Smith, W7GHT who has been kind enough to help me before, and it is:

Erwin B. Beckman, W7SUY
All Counties #134, 8-14-75

"BUD" was born October 7, 1936 in Nampa, Canyon County, Idaho, and has remained a resident of

Bud, W7SUY on the left, Bud, W7WVD on the right, with hat, Foto taken by Kelly, WA6GHH during the Micro-mini at Emmett, Idaho, August, 1976.

Nampa all his life. His start in radio came when his ninth grade science teacher had the entire class learn the code. To further pursue his interest, Bud purchased a surplus BC-454 and continued to listen and copy amateurs in the Novice bands.

*P.O. Box 73, Rochelle Park, NJ 07662

Special Honor Roll
(All Counties)

#168—Robert C. Brown, WA3VLB 6-9-77
#169—Mel Boatman, W5AWT 6-29-77

In 1952, at the age of 16 he was licensed as WN7SUY and soon after he was able to drop the "N," and he now has his Extra license.

Bud served in the Armed Forces and was overseas in Germany. Upon his return he worked in a local (Nampa) plant. In 1962 a Hyster fell on him and this accident paralyzed him from the waist down. Undaunted, he returned to college and earned a degree entitling him to teach in High School. Ultimately he gave up this profession as the small community High Schools in his area soon required that each of their male teachers also coach a sport.

Bud was introduced to County Hunting by Al, K7OQZ, also of Nampa. He listened for a few evenings before he "jumped in" to give out Canyon, Idaho.

USA-CA Honor Roll

3000		1500		500	
WA3VLB	187	WØFF	324	VE3-9094	1178
W5AWT	188	W5AWT	325	WB9RCY	1179
2500		**1000**		K8IWC	1180
W5AWT	237	VE3-9094	437	EA4CR	1181
2000		W2MIG	438		
WØFF	273	WB9RCY	439		
W5AWT	274	W5AWT	440		

Bud has been hooked on County Hunting ever since, and his last county came from Jim, WA7PHD who was on a cross country jaunt. That last county came after a mornings frustration of not hearing Jim, but fortunately when WA7PHD arrived in that last needed County, Bud heard him loud and clear.

Again it was Bill, W7GHT who helped Bud get all his paper work completed and mailed the Application/Record Book for Bud to receive USA-CA-500 through USA-CA-3000 endorsed All SSB and All Counties, Mixed.

The Sun City Award.

Awards Issued

Bob Brown, WA3VLB made them *All* and also got USA-CA-3000 endorsed All SSB.

Mel Boatman, W5AWT was in the first group to be issued USA-CA-500 back in September 1961, when he received #1-U. In the meantime, much water has gone over the dam and Mel has been very happy and very busy giving out so many counties to the needy. Well he finally found time to catch up on his paper work and I was delighted to issue

Karel Sokol, now OK1DKS who as OK1-15835 received USA-CA-500-#1164, March 16, 1977.

him: USA-CA-1000 through USA-CA-2500 endorsed All SSB, All 14, Mobiles; USA-CA-3000 endorsed All SSB, All Mobiles *and* All Counties.

John Glasscock, WØFF (ex-KØRTH) qualified for USA-CA-1500 endorsed All Phone; and USA-CA-2000.

Basil Gould, VE3-9094 (ex G-9094) acquired USA-CA-500 and USA-CA-1000 endorsed All A-1. He is the 6th

Worked Florida Cities Award.

25 Achievement Awards.

Canadian SWL to receive USA-CA-500 and the 3rd to receive USA-CA-1000.

Ed. Berzin, W2MIG straightened his records to obtain USA-CA-1000. Ed is the *new* Awards Manager for the North Jersey DX Association.

Dorothy Johnson, WB9RCY with her big signal had no trouble getting USA-CA-500 and USA-CA-1000.

Ray Kushler, K8IWC had me send him USA-CA-500 endorsed All 2X SSB, All 75, All Fixed Stations in All 50 States.

Progress Award—50 Achievement Awards.

Santos Yebenes, EA4CR (ex EA5-BE, EAR 233) won #1 USA-CA-500 to Spain, endorsed All CW.

Awards

The Amateur Radio Achievement Club and **The Amateur Radio Club Of Florida** of 1851 66th Avenue N., St. Petersburg, Florida 33702 have fine Awards Programs, and it will take me a couple of months to cover some of their fine Awards.

Class A1 Honors 200 Awards.

Worked Florida Counties: To promote activity with Florida Amateurs this realistic County Award is issued. It is two colored, special design with a map of Florida and County names in the background and printed on semi-gloss paper. To win—work:

Class D—30 Florida Counties; DX (Inc. KH & KL) 20 Florida Counties.

Class C—45 Florida Counties; DX (Inc. KH & KL) 35 Florida Counties.

Class B—55 Florida Counties; DX (Inc. KH & KL) 45 Florida Counties.

Class A—67 Florida Counties; DX (Inc. KH & KL) 55 Florida Counties.

Send GCR list and $1.00—All USA-CA rules apply—As you progress to higher class, New certificates will be issued for 10¢ each.

Available to SWL on heard basis. If contacts made on 6 & 2 meters, the DX requirements apply.

The Sun City Award: This Certificate promotes "The Sun City", St. Petersburg, Florida. It is printed in three colors with Mr. Sun predominating. It is specially designed with elaborate art work and printed on semi-gloss paper. To win this Award: Work 10 amateurs in St. Petersburg or the greater St. Petersburg area which consists of St. Petersburg, Pinellas Park, Bay Pines, Indian Rocks, Largo, Treasure Island, Redington Beach and St. Petersburg Beach. Price is $1.00—Send log data only. Available to SWL on heard basis. If all VHF contacts, work 8.

Worked Florida Cities: Work any 10 of Florida's largest Cities, which are: Miami, Jacksonville, Tampa, St. Petersburg, Orlando, Ft. Lauderdale, Hialeah, Miami Beach, Pensacola, West Palm Beach, Tallahassee, Lakeland, Hollywood, Coral Gables, Clearwater, Sarasota, Daytona Beach, Key West, Panama City, and Gainesville. This Award is also Art Designed in two colors and printed on semi-gloss paper. Send GCR list and $1.00. Available to SWL on heard basis. If all VHF contacts, work 8 only.

Amateur Radio Achievement Awards: 25 Achievement Awards includes an Honorary Membership in the Amateur Radio Achievement Club. Send in a list of your Awards (25) and have it certified to by two other Amateur Radio Operators or an officer of a Radio Club or have it notarized. This is our general certification rule (GCR) that must accompany each applicant's list that either of these people have seen the issued Awards and certify thereto. Price of this Award is $2.00.

Worked Florida Counties Award.

Progress Certificate: 50 Achievement Awards. To attain this Award you must have 50 achievement Awards and be an honorary member of the Amateur Radio Achievement Club—in other words you must have the basic certificate or application in order to attain this one. Send GCR list and $1.00.

Century Award: If you have the basic Award and have 100 total Awards, then you can apply for this one and endorsements will be made for the Progress Award without actually applying for it. Price $1.00, no charge for additional endorsements.

Century Award.

Class A1 Honors 200 Awards: Issued for the achievement of 200 Awards. On the basis of accomplishment this will be rather difficult to attain, but worthy of any one seeking Class A1 as an Award seeker. Price $1.00 with endorsement for lower grades at no extra charge.

(Continued on page 91)

Ultimate Achievement Award.

a monthly feature by

FRANK ANZALONE, W1WY

Contest Calendar

News/views of on-the-air competition

The John Martin, VK3JW Memorial Award for top score on 14 MHz phone in Oceania was inadvertently left out of the Contest Results in the August 1977 issue. This was due to no fault on the part of the Committee but because the award did not appear in the list of Awards in the rules announcement. It appeared in a later issue, Oct. '76.

The winner of this Award in the 1976 Phone Contest, donated by the International Pacific DX Net, is Chris D. D. Todd, VK6CT with a score of 431,001 points. (less than 2000 points over KH6GMP).

There are a couple of address corrections in contests that were announced last month. In the North America Sprint the correct street number is 35 Belcher Street.

And in the VK/ZL/Oceania Contest your logs should go to: The WIA Contest Manager, G.P.O. Box 1002, Perth, 6001 Western Australia.

In looking over the 160 Contest Results on page I was puzzled by the lack of entries from the New England area. More so when I checked my own log and found that I had worked a flock of W1's. It was refreshing however to see that the DX returns from overseas were almost as high as from state-side stations. They at least showed their appreciation by reporting their activity.

73 for now, Frank, W1WY

RSGB 21/28 MHZ Phone Contest

From 0700 to 1800 GMT Sunday, October 9

Stations outside the British Isles will concentrate their efforts and work the G, GC, GD, GI, GM and GW's on 21 and 28 MHz. Entries however are limited to single operator only.

It's a shorty, 11 hours only, and like the past couple of years the scoring system is based on a multiplier system.

The same station may be worked once on each band for QSO and multiplier credit. Use a separate log sheet for each band.

*14 Sherwood Rd., Stamford, Conn. 06905

Calendar of Events

*Oct.	1-2	California QSO Party
*Oct.	1-2	VK/ZL/Oceania Phone
*Oct.	8-9	VK/ZL/Oceania C.W.
Oct.	8-9	RSGB 21/28 MHz Phone
Oct.	8-10	ARCI QRP Contest
Oct.	12-13	YLRL Anniv. C.W. Party
Oct.	14-16	Boy Scouts Jamboree
†Oct.	15-16	WADM Contest
Oct.	15-16	Manitoba QSO Party
Oct.	15-16	RSGB 7 MHz Phone
Oct.	22-23	WE TelCo. QSO Party
Oct.	**29-30**	**CQ WW DX Phone Contest**
Nov.	3-4	YLRL Anniv. Phone Party
Nov.	4-7	CHC/FHC/HTH Party
Nov.	5-6	RSGB 7 MHz C.W. Contest
Nov.	5-6	ARRL C.W. Sweepstakes
Nov.	12-13	European RTTY Contest
Nov.	12-13	Int. Police Assoc. Party
Nov.	13	Czech. DX Contest
Nov.	19-20	WWDXA C.W. Contest
Nov.	19-20	ARRL Phone Sweepstakes
Nov.	**26-27**	**CQ WW DX C.W. Contest**
Dec.	2-4	ARRL 160 Contest
Dec.	3-4	Spanish Phone Contest
Dec.	10-11	Spanish C.W. Contest
Dec.	10-11	ARRL 10 Meter Contest

* Covered last month.
† Not Official

Exchange: The RS report plus a progressive contact number starting with 001.

Scoring: Each contact with a British Isle station is worth 3 points. Multiply total QSO points from each band by the sum of British Isles prefixes worked on each band for your final score. (a maximum of 36 possible on each band. GB prefix does not count.)

There is also a s.w.l. section. Only British Isles stations are to be logged. Scoring is same as indicated above.

There was no mention of awards for overseas stations but I'm sure some kind of recognition will be made.

Logs should be received no later than December 5th. This year they go to: R. L. Glaisher, 279 Addiscombe Rd., Croydon, CR0 7HY, England.

ARCI QRP Contest

Starts: 2000 GMT Saturday, Oct. 8
Ends: 0200 GMT Monday, Oct. 10

This is the Fall edition of the Amateur Radio Club International QRP contest. It's open to all, both members and non-members. Stations may be worked once per band for QSO and multiplier credit.

Exchange: RS(T) and state, province or country. Members will include their QRP number, non-members their power input.

Scoring: Contacts with a member count 3 points, with a non-member 2 points. Stations other than W/VE 4 points.

Multiplier: One for each state, province and country worked on each band.

There is also a power multiplier.

Over 100 watts input .....X 1.
25 to 100 watts input .....X 1.5
5 to 25 watts input .....X 2.
1 to 5 watts input .....X 3.
Less than 1 watt input .....X 5.

Final Score: QSO points from all bands × states, provinces and countries per band × power multiplier.

Frequencies: CW: — 3540, 7040, 14065, 21040, 28040. S.S.B. — 3855, 7260, 14260, 21300, 28600. Novice— 3720, 7120, 21120, 28040.

Awards: Certificates to the highest scoring station in each state, province and country. Additional awards depending on activity. And a certificate to the station showing three "skip" contacts using the lowest power.

Include a summary sheet with your entry with the scoring, equipment and power used, and a signed declaration. Include a large s.a.s.e. if results desired.

Logs must be received before Nov. 30th and go to: E. V. "Sandy" Blaize, W5TVW, 417 Ridgewood, Drive, Metairie, LA 70001

YLRL Anniversary Party

C.W.: Oct. 12-13 Phone: Nov. 3-4
C.W.: 1800 to 1800 GMT Wed./Thurs.
Phone: 1800 to 1800 GMT Thurs./Fri.

This is strictly a YL affair open to all YL's around the world. Its the 38th annual party run by the YL Radio League.

All bands may be used. Phone and c.w. are separate contests.

Exchange: Signal report and ARRL section, country for DX stations.

Scoring: One point per QSO between stations within an ARRL section, and between DX stations. Two points if between DX and ARRL section stations. The same station may be worked once only regardless of band.

Multiplier: Is derived from the number of ARRL sections and DX countries worked. There is also a low power multiplier of 1.25 if input is 150 watts or less, 300 watts p.e.p. if on s.s.b.

Final Score: Total QSO points × ARRL sections and countries worked × power multiplier if any.

Awards: 1st, 2nd and 3rd place certificates to winners in each call district and DX country. And two gold cups, phone and c.w., to the top YLRL member in the world. There are also three special plaques for YLRL members. The Corcoran for the highest combined phone/c.w. score in an ARRL area, the Hager for the highest combined score for North and Central America and Caribbean areas, and one for rest of world.

Logs should be received before the end of November and go to: Carol Bourne, WA9NEJ, 362 Hawthorne St., Glen Ellyn, Ill. 60137

Scouts Jamboree-on-the-Air

Starts: 1800 Friday, October 14
Ends: 2400 Sunday, October 16
(Local Time)

This is the 20th annual worldwide Jamboree in which Scout Amateurs promote world wide friendship on the air. It is also a fine opportunity to introduce amateur radio to newcomers. Individual amateurs and radio clubs are encouraged to invite scouting groups to their shacks to QSO other Scouts. Amateurs who are interested should inform their local scout council concerning their availability for the JOTA.

Frequencies: Phone — 3740, 3940, 7090, 7290, 14290, 21360, 28990. C.W. — 3590, *3740, 7030, *7140, 14070, *21140, 28190. (*Novice) Also 2 and 6 meters. (Above are calling frequencies) Listen especially for K2BSA, the National Headquarters station.

Logging Info: List all stations worked or heard in JOTA activity, time in GMT. Indicate if other station is a Scout, Scouter or has been either one. And how many Scouts or Scouters were present. Tally up the number of JOTA contacts, stations with Scouts or Scouters operators, and number who participated from your station.

Awards: The JOTA Certificate will be awarded to all participants, amateurs, Scout groups and s.w.l.s who submit a report.

Scout and Scouter amateurs are invited to participate with K2BSA in the informal nets on Wednesdays from 2000 to 2300 on 3740, 3940, 7140, 7290 MHz, and on Saturdays from 0900 to 1400 on above frequencies plus 14290, 21140, 21360. All local standard time. If no activity is heard start some by calling "CQ Boy Scouts."

Logs and reports for the JOTA and QSLs for K2BSA go to your National Coordinator. In the USA it is Harry Harchar (W2GND) c/o K2BSA, Boy Scouts of America, North Brunswick, N.J. 08902

The CQ Booth at the Dayton Hamvention last April was the meeting place for Contesters, DXers and others. Here we see, L. to R.—Myron Crofoot, WB4VQO, Dick Ross, K2MGA, Don Reihoff, CT4AT, W1WY, Bernie W8IMZ and Mich Wetzel, WA9BWY.

WADM Contest

Starts: 1500 GMT Saturday, October 15
Ends: 1500 GMT Sunday, October 16

In last year's announcement the Radio Club of the GDR indicated that s.s.b. would be included in this year's contest. However I have not received any additional information and inquiries have gone unanswered. The best I can offer is a repeat of last year's rules as a possible guide line in case you hear any activity on the above dates.

There are three classifications, single and multi operator and s.w.l. The same station may be worked once on each band for QSO and multiplier credit.

Exchange: Signal report plus a contact number starting with 001. The DM stations will send a signal report and the number of their district.

Scoring: Three points for each DM contact. Multiply total by sum of DM districts worked on each band. A district is identified by the last letter in the call, not by the number in the prefix. (A thru O, a max. of 15 on each band).

Awards: Certificates to the 1st, 2nd and 3rd place winners in each country. Contest QSOs may also be applied for the many GDR awards. WADM, DMCA, DMDXC, DMKK. Additional information is available from the GDR.

Logs go to: Radio Club of the GDR, Att: Contest Manager DM2ATL, P.O. Box 30, DDR 1055 Berlin, German Democratic Republic.

Manitoba QSO Party

Starts: 2200 GMT Saturday, October 15
Ends: 0200 GMT Monday, October 17

This is the 4th QSO party and also the 25th Anniversary of the Amateur Radio Clubs of Manitoba. The same station may be worked on each band and mode, and VE4 to VE4 contacts are permitted as are 2 meter simplex.

Exchange: RS(T), name and QTH. Municipalities for VE4; state, province or countries for others.

Scoring: One point per QSO. VE4's multiply total by number of US states, VE provinces and DX countries worked. All others multiply total number of QSO's by the number of Manitoba Municipalities, local districts, provincial parks and forest reserve worked. (max. of 134). There is a bonus multiplier determined by the number of ARLM members worked that is added to the territorial multiplier.

Frequencies: C.W. — 3705, 7105, 14065, 21205, 28205. S.S.B. — 3770, 3905, 7195, 7230, 14190, 14285, 21245, 21355, 28600.

Awards: Certificates to the top scorers in each province, state and DX country. Plaques to the top scor-

1976 S.A.C. Contest Results

C.W.

VE3GCO	216
VE3BR	190
K2SIL/1	1,078
WA1STN	774
K1IIK	265
W1OPJ	120
AC2EQK	525
AC9SZR/3	1,134
WA3DMH	185
WB3AOP	130
W3ARK	108
AC4WSF	372
AD4BAI	205
W5SOD	18
W6DGH	210
WB6PZW	18
WA7TIM	240
W7QK	138
K9ECE	275
WØBMM	308
WAØTAS	208

Phone

VE3GCO	350
VE3BR	80
VE1AIH/1	14
WA1ORP	2
WA2IJO	378
W2JGR	198
W2FCR	92
AA3DMH	160
LU1BAR/W3	144
W4AQL	225
AB6PZW	27
W6DGH	6
K9ECE	300
W9DDL	240
W9LKI	70
WAØTAS	57

ing VE4 and out of province station. Additional awards if warranted.

The Worked All Manitoba Award is available for confirmed contacts with a specified number of Manitoba municipalities. These are issued in graduated classes from 50 to 134. A fee of $1.00 will get you a record book, forms, maps and etc. from VE4QZ.

Mailing deadline for your log is November 14th to: Doug. Bowles, VE4QZ, 1104 First Street, Brandon, Manitoba, Canada R7A 2Y4

RSGB 7 MHz Contest

Phone: Oct. 15-16 C.W.: Nov. 5-6

Starts: 1200 GMT Saturday

Ends: 1200 GMT Sunday

Like the 21/28 MHz phone contest this one also is for exchange between the British Isles and the rest of the world. However a different format is used for the scoring. Only single operator entries are eligible. Phone and c.w. are separate contests.

Exchange: RS(T) report plus a progressive contact number starting with 001.

Scoring: Stations in Europe score 5 points for each British Isle QSO, those outside of Europe score 15 points. In addition, all may claim a bonus of 20 points for each different British Isle country prefix worked. (G2, GC3, GD4, GW4 and etc., a max. of 35 possible. No credit for GB prefix.) There is no multiplier, just add your QSO points and bonus points for your final score.

1977 B.A.R.T.G. RTTY Results

K5ARH	235,056
W3FV	219,186
W2NZ	218,988
W4CQI	217,816
VE5RG	211,224
KØPJ/6	201,096
WAØTAS	164,696
WØHAH	157,568
K7BV	156,552
K6WZ	154,224
WAØYDJ/4	139,356
W3KV	126,654
VE2QO	111,606
W7MI	110,922
WA9AKT	87,360
VE2JR	86,944
K5ETA	73,584
K1LPS	67,032
W6JOX	59,126
WB0LSY/VE7	54,080
W7CBY	48,790
K1GYF	41,650
K9KHI	39,000
VE7DTA	37,314
VO1EE	36,480
K4JAF	34,752
W8GKW	27,140
K4VDM	24,200
VE7BDQ	22,584
W1ID	19,740
W4YZ	12,960
VE3BPM	10,200

Multi-Op.

W1MX	297,042

(K5ARK was 6th World High. W1MX was 3rd.)

There is a s.w.l. section with scoring same as above except that the prefix bonus is 50 points. Overseas listeners to log British Isle stations only.

Appropriate certificates will be awarded.

The phone entries must be received no later than December 16th, the c.w. January 2nd. This year they go to: RSGB HF Contests Committee, c/o A. M. Smith, 279 Addiscombe Rd., Croydon, CR0 7HY, England.

WE TelCo QSO Party

Starts: 1700 GMT Sat. October 22

Ends: 0400 GMT Mon. October 24

The Bell Labs. Murray Hill ARC is the host for this year's contest. The activity is geared for TelCo. employees and retirees, especially those at Western Electric, Bell Labs., A T & T Long Lines and Teletype Corp.

Operation is divided into several sessions as follows:

#1—h.f./v.h.f. phone — 1700 to 2200z, Saturday October 22.

#2—h.f./v.h.f. c.w. and RTTY — 2300 to 0400z, Sat./Sun. Oct. 22/23.

#3—h.f./v.h.f. c.w. and RTTY — 1700 to 2200z, Sunday October 23.

#4—h.f./v.h.f. phone — 2300 to 0400z, Sun./Mon. Oct. 23/24.

For more details send a s.a.s.e. to: Robert L. Brown, W2EME, 65 Hillside Ave., Berkeley Heights, N.J. 07922

CQ World Wide DX Contest

Phone: Oct. 29-30 C.W.: Nov. 26-27

Starts: 0000 GMT Saturday

Ends: 2400 GMT Sunday

Complete rules appeared on page 24 of last month's issue. Since there are a few modifications in this year's rules it is advisable that you review them thoroughly.

Briefly they are as follows:

1. Dupe sheets are now required from entries with 200 or more contacts on any single band.

2. A penalty of 3 contacts will be deleted from the score for each duplicate contact left in a log.

3. Spotting nets or other assistance at a Single Operator station puts that entry in the Multi-Operator category.

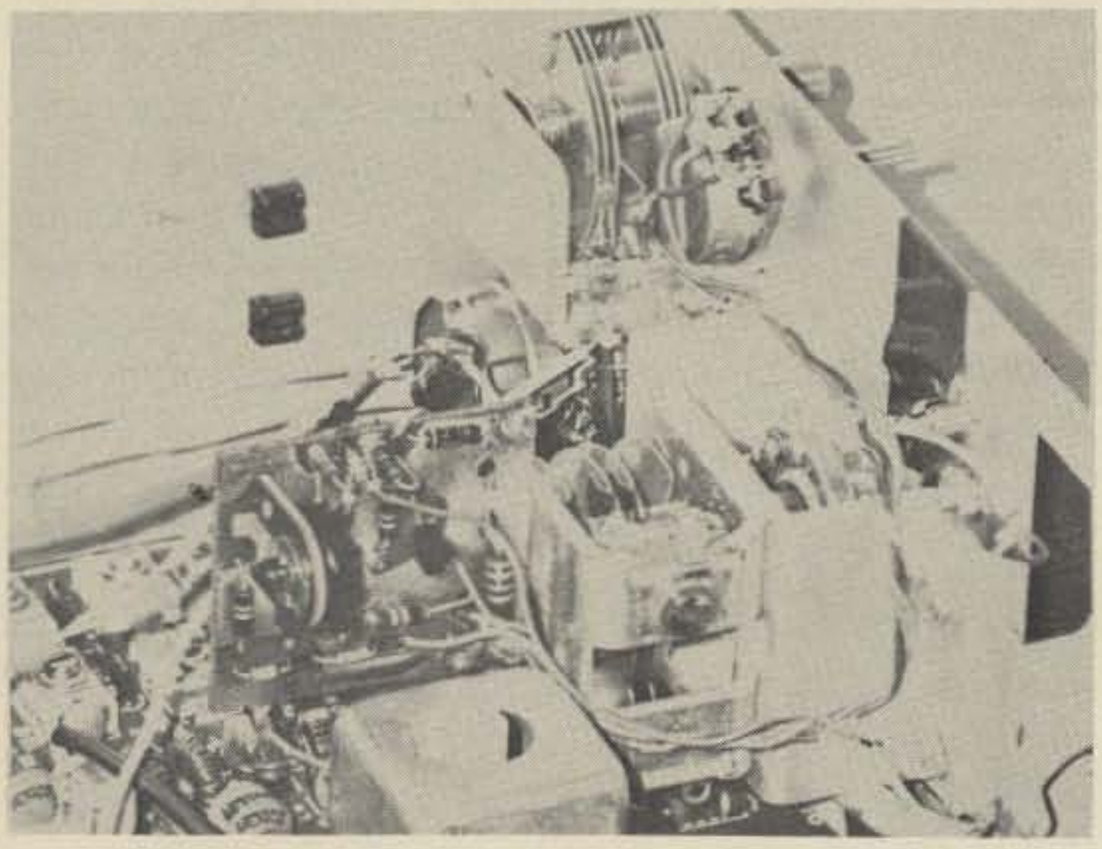
4. Stations not operating from their licensed location are required to sign their portable location.

5. For purposes of Awards, a station will be considered as a resident of that country if he has an established P.O. address.

6. Eight additional Awards have been added to our Trophy List, making a total of 38 now awarded.

(Continued on page 95)

HW-8 Modifications *(from page 65)*



Another view of RIT mounting leads. The board shown is a prototype and differs from the one shown in figure 5.

edges of the chassis front panel. Replace the front panel and carefully line up the center point for the mounting hole on it, using the crosshair lines as a guide. Take time with this procedure so that exact lineup is achieved. Drill the hole thru both the front panel and chassis at the same time to insure proper lineup. Some reaming/filing may be necessary to perfect R5 placement. Mount R5. Photo 6 shows the clearance between R5 and preselector tuning capacitor C301. It is a close tolerance fit, but careful measurements pay off.

( ) Return to the RIT board. Cut three 6-inch leads, solder them into holes A, C, and D, and twist to form a cable.

( ) Solder a 3½-inch lead into the B+ hole of RIT board.

( ) Solder a pair of 12-inch leads into the Spot switch holes of RIT board.

( ) Solder a 3½-inch lead into the "T" hole of RIT board.

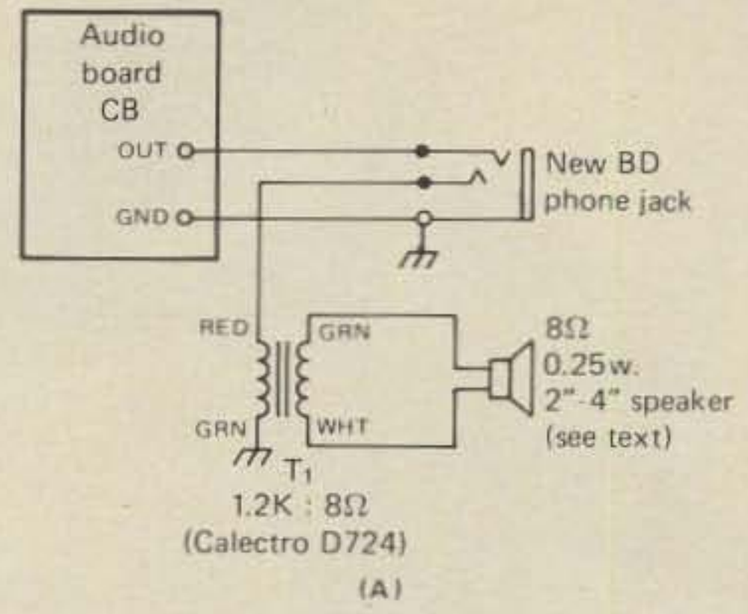
( ) Mount the RIT board. First, remove the screw on the bottom rear of C302 (photo 4), and mount the "L" bracket at that point. Then mount the RIT board directly on the short leg of the "L" bracket.

( ) Trim the "to RIT board" lead previously soldered into the HW-8 board to reach the RIT board hole E, and solder into place.

( ) Solder the RIT B+ lead to terminal 8 of AF (Pictorial 4-4).

( ) Position the three-wire twisted cable from RIT board A-C-D as shown in photo 7. Trim ends and solder to three terminals of R5, taking care to attach lead C to the center terminal of R5.

( ) Solder the "T" lead from the "T" hole of RIT board to SW4, pin 6 (Pictorial 3-3). The in-circuit operation of the RIT unit can now be checked.



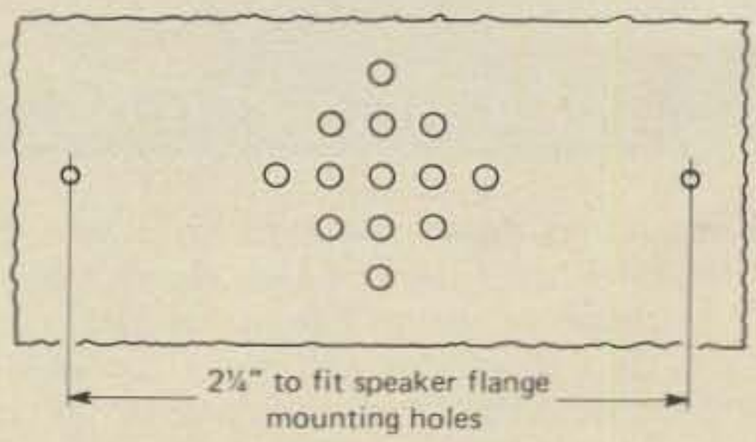


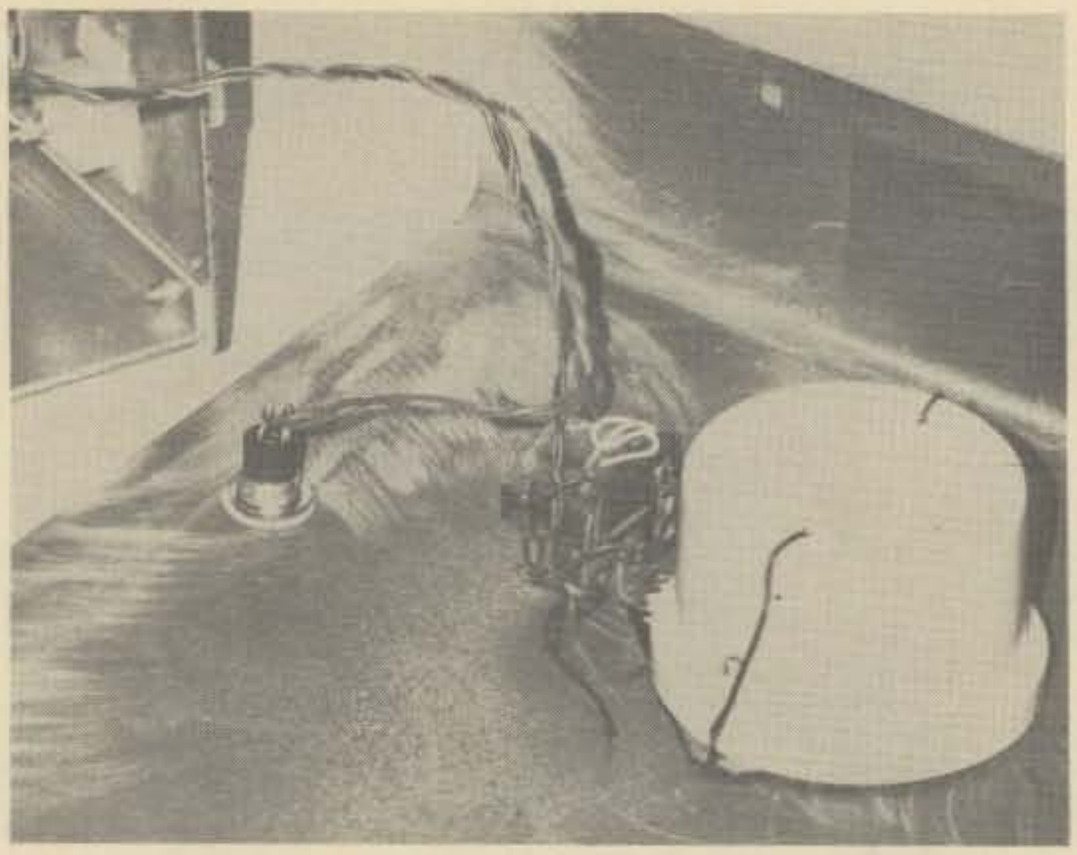
Fig. 8—(A) Loudspeaker Connections. (B) Speaker Grill Drilling Template.

( ) Find the HW-8 signal (80 meters) on a separate receiver with R5 set at midrange. Press the Spot switch and adjust R1 to bring the Spot frequency to zerobeat with the receive frequency.

( ) Press the HW-8 key and verify that the transmit and Spot frequencies are almost exactly the same (75 Hz difference is negligible). If the Spot and transmit frequencies are more than 75 Hz or so apart, vary the loading control on the HW-8 front panel while holding the key down to determine if the v.f.o. is being "pulled" away from the Spot frequency. If the frequency difference between Spot and transmit is the result of "pulling," this separation will differ on each band, and there is little that can be done to eliminate it other than to note the amount of separation and mentally note how much to offset the Spot frequency from zerobeat on each band. The unit described had only negligible separation between the two frequencies. By varying the value of R9 you can obtain a very close, if not exact, matching of the Spot and transmit frequencies.

( ) Proceed with final adjustment of R1, so that the frequency corresponds with the midrange RIT control (R5) setting. Once the Spot and receive midrange modes are exactly the same, pressing the Spot switch while listening to an incoming signal will produce no shift in tone.

( ) Spot switch mounting. Photo 8 shows the mounting position used in the unit described. It is on the top shell of the HW-8 about 1 inch from the front, and 3½ inches from the side. This position was selected to permit pressing the Spot



Spot switch mounting detail. Twisted Spot switch leads are twisted together with the speaker leads from phone jack BD. T1 is mounted on a 2-terminal strip. The terminal strip shares a common mounting screw with the speaker flange mounting hole. The plastic spray-paint can top serves as a compression chamber to raise the response frequency of the speaker, and is simply wired into place.

switch with the index finger of the hand turning the main v.f.o. tuning knob while zerobeating a station. Any type of switch is suitable, but for ease of operation a spring-return momentary contact pushbutton unit was selected (Mallory, SPST, 992/8411K11 Normally Open). Drill the hole for the switch, mount, and connect the 12-inch Spot switch leads to the switch terminals. This completes installation and adjustment of the RIT unit.

When monitored on an external receiver, the HW-8 v.f.o. will switch instantly between receive frequency, and Spot or transmit frequency when the Spot switch or key are pressed. The function of R10 is to discharge C2-C3 almost instantly; otherwise, the discharge rate causes the frequency to sweep between receive and transmit modes. The operator should take 15 minutes to familiarize himself with the operation of the RIT unit.

Find the zerobeat setting of the RIT tuning control (R5) by listening to a signal in the Spot mode, and adjusting R5 until it produces the exact same audio note as the Spot switch. That setting of R5 can be marked with the tip of a permanent ink marking pen on the front panel. Next, zerobeat an incoming signal and tune R5 until the signal produces an audio note. Then retune the signal to zerobeat with the main v.f.o. tuning control to see which way the RIT control moved the receive frequency away from zerobeat. If it moved the v.f.o. upward, that side of the RIT tuning zerobeat mark can be marked + or UP, and the other side — or DOWN. This enables the operator to familiarize himself with the relationship between the RIT tuning control and the main v.f.o. tuning dial. If precision is desired, a calibration scale can be marked on the HW-8 front panel showing UP or DOWN offset in .25 kHz steps, or whatever is suitable. Next, find two signals separated by about 2200 Hz as described in the earlier example, and tune (with RIT at zerobeat (between them so that they produce nearly equal notes. Then move the RIT frequency to the sideband which eliminates the undesired signal. Once you've performed this experiment, the value of the RIT modification will become immediately apparent. Contesting with this automatic RIT is a breeze, because the HW-8 can be tuned around with the RIT at zerobeat, a desired signal found and tuned to zerobeat, and then a quick swish of the RIT shows which sideband permits the clearest reception of that signal. Of course, the transmitter will be right at zerobeat when the station is called.

Loudspeaker

One drawback of rigs like the HW-8 is the necessity of wearing earphones all the time. During a twenty-hour contest period, even lightweight phones can make the operator's ears feel like they've just been through 15 rounds with Ali. Fortunately, the HW-8 audio amplifier provides more than adequate drive for a 0.25 watt, 2½-inch miniature speaker such as has been installed in the present unit. This size speaker will fill a room with sound at a 50 percent a.f. gain control setting, and will distort from overdriving at about 75 percent gain with a moderate signal. So, a large speaker could be used if desired. Installation is quite simple. Refer to Pictorial 4-4.

( ) Disconnect the leads from phone jack BD and remove it.

( ) Replace phone jack BD with a two-conductor Normally Closed phone jack and wire as shown in figure 8.

( ) Connect the ground wire from audio board CB to the jack ground terminal.

( ) Connect the "OUT" lead from audio board CB to the phone jack terminal (BD) which makes contact with the end of the inserted earphone plug. Solder.

( ) Cut a pair of 10-inch leads and twist. Connect one lead to the ground terminal of jack BD, and solder. Connect the other lead to the remaining jack terminal. This terminal connection to the "OUT" lead is broken when a phone plug is inserted into the jack BD, thus disabling the speaker. A VOM or VTVM can be used to verify the proper connections.

( ) Photo 8 shows the approximate position of the speaker on the HW-8 top shell. Locate a center 2¾ inches from the rear of the top shell and 2¾ inches from the side. Place the speaker on that center and drill two holes to match up with

the mounting holes in the speaker flange. *NOTE:* some miniature speakers have no mounting flange; if this type is used, a bracket must be fitted across the rear of the speaker to hold it in place. If possible, pick a speaker with the mounting flange.

( ) Drill several holes in the top shell as shown in figure 8B to form a grill. The position of the holes should be marked on the top side of the shell, covered with scotch tape to avoid slippage scratching, and drilled from top-side.

( ) Mount the audio-matching-transformer on a two-terminal strip by inserting its mounting flange in the terminal holes and crimping. Feed the transformer input leads through one terminal strip base hole and tie; repeat with the output leads.

( ) Mount the speaker and terminal strip on a common screw as shown in photo 8. Solder the transformer output leads to the speaker terminals.

( ) Solder the 10-inch twisted leads from phone jack BD to the proper colored input leads of the audio transformer.

( ) Turn on the HW-8 and verify that the speaker is working. Then insert the earphone plug into jack BD to confirm that it disables the speaker. If the speaker continues to produce sound while the earphone plug is inserted in jack BD, reverse the connections on terminals 1 and 2 of jack BD.

( ) Place the top shell back on the HW-8 and assess the audio quality of the speaker. If it is too "bassy," the frequency response can be raised by using the plastic top of a spray paint can (or similar cup) as a compression chamber as shown in photo 8. Experimentation with different sized cups will show which is suitable for the operator's taste. It's not hi-fi, but it sure is nice c.w.!

This completes speaker installation. The speaker quality is good through about 75 percent of the a.f. gain range, but above that the speaker is overdriven and distorts. The speaker is a worthwhile addition and frees the operator from earphones if he wishes to move around, or just monitor a frequency while tinkering in the shack. Furthermore, it helps in impressing visitors to the shack that *this* HW-8 isn't just a toy!

Conclusion

The modifications described in this two-part article turn the superb HW-8 into a really deluxe unit that will hold its own against more expensive commercial units as far as flexibility is concerned. The Old Man always used to say, "If you have a really good thing, why not make it better yet?" "Sure, why not?" I said, and I am really pleased by the end result. Maybe Heath started something really good in the HW-8, but I know that I've finished the job! ■

Parts Sources

The following items can be ordered from Circuit Specialists Co., P.O. Box 3047, Scotsdale, AZ 85257, or similar supplier.*

VR1: R2503/MV2503 33 pF Varactor ($1.10) (HEP R2503).
Q1: 2N3565 ($0.23), **Q2:** 2N3906 ($0.53).
RFC1: Miller 70F103A1 ($1.02); or FB-43-801 jumbo bead, Amidon Associates, 12033 Otsego, North Hollywood, CA 91607, $3.00/dozen.
12.1 v zener: 1N759 (3/$1.00).
D1-5: 1N914 (16/$1.00).
R1: *B1-643* (2K ohm OK) ($0.50).
Phone jack BD: Smith #276 ($0.60).
T1: Calectro 1.2K:8-ohm audio xmfr D724 ($1.10).
Spot switch: Momentary contact, Norm. Open, E2-140 ($0.95).
R5: RIT pot Mallory submin. #VW2P5K 2.5K ohm ($1.76).

*Most items can also be obtained at Radio Shack stores. G.R. Whitehouse & Co., 11 Newbury Drive, Amherst, NH 03031 can supply the FB-43-801 jumbo beads for $1.50/dozen, as well as many of the other parts. Send a 13c stamp for their latest flyer. ■

Novice *(from page 75)*

If you are having trouble obtaining help in upgrading from the Novice license, you can make the grade on your own by reading useful articles in amateur radio magazines. These articles provide simple explanations of even the most complex subjects. I hope you will not give up in your quest to advance in amateur radio because we need you and we want you as active amateurs. Read selected magazine articles and let the experts help you make the grade.

My interest in Novices and their problems is very strong. I have conducted licensing programs since before the Novice class license was established in 1951 and 29 years of helping new amateurs has taught me a few things about helping them overcome their problems. If you will let me know which problems you believe are most urgent, I will deal with those subjects first. It is reasonable to assume that certain basic facts will be repeated at times since most Novice problems are not new. It is quite possible that future columns will be very similar to some of Herb's past ones since our viewpoints were very similar in regard to the needs of Novices. I want to take advantage of this opportunity to get useful information to those of you who want help. Repeating basic information is a good approach when writing a column for beginning amateurs who probably have not read previous issues of *CQ*, or any other amateur radio magazine.

In addition to your comments and questions, I need a good black-and-white photograph (matte or glossy) of your radio shack, with you in the picture. One photograph is selected for each Novice column as Novice of the Month, and that amateur receives a free one-year subscription (or extension) to *CQ*. The selected photo will not be returned but others will be if the usual self-addressed and stamped envelope is enclosed. Photographs are needed each month so don't hesitate to submit them several times while you are a Novice.

I hope to hear from you in writing and on the Novice bands. I have worked 100 to 2000 Novice band contacts each year since the Novice license was established and I am active almost every day on the Novice bands. I use several callsigns each week as I check out new stations for students. Some of the Novices I have heard or worked during the past month include WB1AIH (Bob), WB2JGQ (John), WB3IPF (Glenn), WA4PFI (John), WB5VSN (Nick), WA6MET (Wayne), WB7PVL (Don), WD8JCR (Jim), WB9YSR (Debbie), and WBØUUW (Kim).

73, Bill, W6DDB

Math's Notes *(from page 73)*

as will universal motors for speed control applications.

When working with those devices at a.c. line potential please be sure to exercise caution. An isolation transformer should positively be used on the a.c. line and all connections carefully checked.

Next month we will take a look at SCR's and see how they are similar and their various applications. There are many circuits available for use with these devices and a very good reference that explains theory and practical applications is the *General Electric SCR manual* which is available from G.E. distributors for only $3. This 687 page volume is the source for much of the information given here.

73, Irwin, WA2NDM

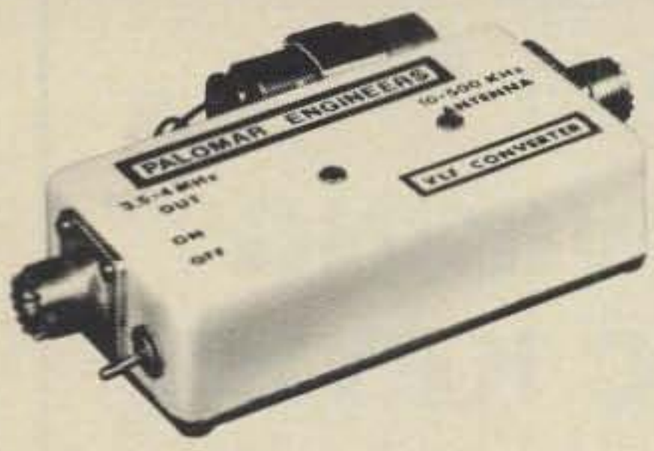
DX *(from page 79)*

12, 1977 in celebration of the Queen's Jubilee.

IK—The IK prefix is being used in Italy from Sept. 1-Nov. 30, 1977.

JY25—From May 24-June 25, stations in Jordan used the special prefix JY25 to commemorate the King's Jubilee.

VLF CONVERTER



- **New device opens up the world of Very Low Frequency radio.**
- **Gives reception of the 1750 meter band at 160-190 KHz where transmitters of one watt power can be operated without FCC license.**
- **Also covers the navigation radiobeacon band, standard frequency broadcasts, ship-to-shore communications, and the European low frequency broadcast band.**

The converter moves all these signals to the 80 meter amateur band where they can be tuned in on an ordinary shortwave receiver.

The converter is simple to use and has no tuning adjustments. Tuning of VLF signals is done entirely by the receiver which picks up 10 KHz signals at 3510 KHz, 100 KHz signals at 3600 KHz, 500 KHz signals at 4000 KHz.

The VLF converter has crystal control for accurate frequency conversion, a low noise rf amplifier for high sensitivity, and a multipole filter to cut broadcast and 80 meter interference.

All this performance is packed into a small 3'' x1½'' x 6'' die cast aluminum case with UHF (SO-239) connectors.

The unique Palomar Engineers circuit eliminates the complex bandswitching and tuning adjustments usually found in VLF converters. Free descriptive brochure sent on request.

Order direct. VLF Converter $55.00 postpaid in U.S. and Canada. California residents add sales tax.

Explore the interesting world of VLF. Order your converter today! Send check or money order to:

PALOMAR ENGINEERS
BOX 455, ESCONDIDO, CA 92025
Phone: (714) 747-3343

This MFJ Antenna Tuner...

lets you operate all bands — 160 thru 10 Meters — with a simple random wire. Use virtually any transceiver — up to 200 watts RF power OUTPUT.

$39.95

Imagine being able to operate all bands — anywhere, with virtually any transceiver — using a simple random wire and an antenna tuner small enough to carry in your hip pocket. Size is only 2-3/16 x 3-1/4 x 4 inches.

Operate from your apartment with a makeshift wall to wall antenna. Tune a simple vertical for low angle, DX operation. Operate from your motel room with a wire dropped from a window. Tune out the SWR on your mobile whip. Enjoy ham radio on a camping or backpack trip with a wire thrown over a tree. Prepare for an emergency. Take it on a DX expedition or use it for Field Day.

Match both high and low impedances by interchanging input and output. SO-239 coaxial connectors are used.

The secret of this tiny, powerful tuner is a 12 position variable inductor made from two stacked toroid cores, and a quality capacitor manufactured especially for MFJ.

Try it — no obligation. If not delighted, return it within 30 days for a refund (less shipping). This tuner is unconditionally guaranteed for one year.

To order, simply call us toll free 800-647-8660 and charge it on your BankAmericard or Master Charge or mail us a check or money order for $39.95 plus $2.00 for shipping and handling.

Don't wait any longer to operate on all bands. Order today.

MFJ ENTERPRISES
P. O. Box 494
Mississippi State, MS 39762
Call Toll Free ... 800-647-8660

Govt. SURPLUS ELECTRONIC EQUIPMENT CATALOG

New ITEMS . . . New BARGAINS!
FREE ***UPON REQUEST!***
If you haven't received our new Catalog, write for free copy today. Address: Dept. CQ

FAIR RADIO SALES
1016 E. EUREKA • Box 1105 • LIMA, OHIO • 45802

NORTH GEORGIA'S ONLY AUTHORIZED YAESU DEALER

Britt's 2-Way Radio Sales & Service

ADVANCED AMATEUR RADIO EQUIPMENT

YAESU

DAN C. BRITT
432-8006

2508 ATLANTA ST.
BELMONT HILLS SHOPPING CENTER
SMYRNA, GA. 30080

MILITARY SURPLUS WANTED
Space buys more and pays more. Highest prices ever on U.S. Military surplus, especially on Collins equipment or parts. We pay freight. Call collect **now** for our high offer. 201 440-8787.
SPACE ELECTRONICS CO.
div. of Military Electronics Corp.
35 Ruta Court, S. Hackensack, N.J. 07606

"Right on" with Jan Crystals for

- **General Communication & Industry**
- **Citizen's Band (Standard & Synthesized)**
- **Two-Meter - Monitor - Scanners**
- **Marine VHF • Amateur Bands**

Depend on Jan Crystals made in U. S. A. for

- **Frequency Control • Frequency Stability**
- **High Performance**

Send 10¢ for our latest catalog
Write or phone for more details

JAN CRYSTALS
2400 Crystal Drive
Ft. Myers, Florida 33901
all phones (813) 936-2397

(Continued from page 88)

NP4—NP4A marked Amateur Radio Week in Puerto Rico. QSL to KP4-BDL.

OF—From July 1-Dec. 31, 1977, OH stations are using the OF prefix to celebrate the 60th Anniversary of Finland's independence.

UK—In many cases, a UK or Russian Club Station is in the same republic as the corresponding UA prefix. However, this is not always the case, and the following will help you pinpoint the locations of some of these stations: UK2A, UK2C, UK2I, UK2L, UK20, UK2S and UK2W are in UC, White Russian S.S.R.; UK2B and UK2P are in Lithuania; UK2G and UK2Q are in Latvia; UK2R and UK2T are in Estonia; UK5, except UK50, is the Ukraine; UK50 is Moldavia; UK6F, UK60, UK6Q and UK6V are in Georgia; UK6G is Armenia; UK7 is Kazakh; UK8A, UK8C, UK8D, UK8F, UK8G, UK8I, UK8L, UK8O, UK8T, UK8U, UK8V and UK8Z are in Uzbek; UK8B, UK8E, UK8H, UK8W and UK8Y are in Turkoman; UK8J, UK8K, UK8R and UK8S are in Tadzhik; and UK8M, UK8N, UK8P and UK8Q are in Kirghiz.

VA3—VA3RRL was on the air June 3-5, 1977 from the ARRL Convention in Toronto.

VP8—Stations active from the VP8 islands are as follows: *Falkland Islands*—VP8AI, VP8HA, VP8HZ, VP8JC, VP8LP, VP8NL, VP8OI, VP8PC, VP8PE and VP8PM; *South Orkney Islands* — VP8PL; *South Georgia*—VP8OT, VP8OX and VP-8PF; and *Antarctica* — VP8NW, VP8OW, and VP8PJ.

VQ9—Tom, WA6EGL/VQ9, is reported on the low end of 20 meter c.w. QSL to W4FLA.

XO1-XO2—These special prefixes were used by VO1 and VO2 amateurs, respectively, during the month of August, 1977.

QSL Information

QSL each of the following stations to Don Brickey, W70K, P.O. Box 95, Las Vegas, NV 89101: VK4FJ/LH (Lord Howe Island), VK4AK/NI, VK4AK, VR1AF, K6JMZ/VQ9 (Diego Garcia Island), VP2KA, VP2KN, VP2SF and FK8BG.

A4XGX—Via D. MacGregor, Pye T.V.T., B.F.P.O. 66, London England
A6XP—To DJ3NK
CN8CW—c/o P.O. Box 120, Rabat, Morocco
CN8HD—Via W2GHK, P.O. Box 7388, Newark, N.J. 07107
CN8MB—To P.O. Box 8026, Casablanca, Morocco
CT4AT—Via W1JFL, 79 Plymouth Rd., Bellingham, MA 02019
DU6BG—To WA7RFH, Bobby Rice, RFD 2, Gooding, Idaho 83330
EL2FG—c/o WA3NCP, 425 Fourth Ave., Parkesburg, PA 19365
EL2FY—Via JA1NSA, 2964 Koganei, Kokubunji, Shimotsuga, Tochigi 329-04, Japan
EL9D—To VE3BOZ, 42 Warwick Ave., Toronto, Ontario M6C 1T8, Canada
EP2IK—c/o A. Whitehill, IBAC, P.O. Box 14/1684, Tehran, Iran
EP2SV—Via WA6AHF
EP2VW—To W4YE, ex-W4YZC
FG0DDV/FS7—c/o W2JT
FO0MB—Via P.O. Box 12, Papeete, Tahiti, French Polynesia
FY0AYO—To W2JKN, 4665 Iselin Ave., Bronx, N.Y. 10471
HH2MC—Via Dan Craan, P.O. Box 501, Port-au-Prince, Haiti
HR4BBA—c/o I3CYG, Via A. Abondi, 13, I-38100, Trento, Italy
HS4AFD—To DK4HI, Elsassestr. 7, 24 Lubeck, Germany
IE9DMK—c/o I2DMK, Via G. Pascoii 60, I-20133 Milano, Italy
JT0AQ—Via Stan I. Sichow, UT5LK, Box 41, 357 600 Essentuki, Ukraine, USSR
K4SQT/SU—To Melvin J. Broe, c/o Sinai Field Mission, U.S. Embassy Office, Cairo, Egypt
KC4USD—c/o U.S. Coast Guard Cutter Burton Island, FPO, San Francisco, CA 96601
KJ6BZ—Via K0MSP, 1686 Sharp Drive, Rapid City, SD 57701
KP6BD—To K9ECE
OD5FB—c/o F6DSC,
KV4IF—Via W2AAF Chemin des Quartallees, F-38330 St. Ismier, France
OE2WSL/YK—Via OE2WSL, Kas Siezenheim, D-5071 Salzburg, Austria
ON8UH—To W3HNK, Joe Arcure, Jr., P.O. Box 73, Edgemont, PA 19028
OX5AP—c/o WA5ZYF, 5200 Juliandra Ave., El Paso, TX 79924
OY3H—Via W3HNK, P.O. Box 73, Edgemont, PA 19028
UK1ZAA/p—To B. I. Romanov, UA1ZX, Central Radio Club, P.O. Box 88, Moscow, U.S.S.R.
VE8RCS—c/o WA7OBH, 17 South Chouteau, Hardin, MT 59034
VK7GK—Via DL8NU, Silcherstrasse 12, D-7061 Weiler/Rems., Germany
VP2KAB—To W3HNK, P.O. Box 73, Edgemont, PA 19028
VR4DH—c/o P.O. Box 654, Honiara, Solomon Islands
VU2ACD—Via W7PHO, 18549 Normandy Terrace SW, Seattle, WA 98166
W7FPX/SU—To P.O. Box 26410, Tel-Aviv, Israel
WA5UKR/YV5—c/o W3HNK, P.O. Box 73, Edgemont, PA 19028
YS1AJE—Via P.O. Box 22-2180, San Salvador, El Salvador
ZB2DM—To W1JFL, 79 Plymouth Rd., Bellingham, MA 02019
ZD7PV—c/o P.O. Box 8, Jamestown, St. Helena, South Atlantic
ZD8C—Via KP4EKI
ZD8DB—To K4VMA, 1408 Harvard Drive, Cocoa, FL 32922
ZD8EW—c/o G4EHJ, 66 Vicarage Lane, Kings Langley, Herts. WD4 9HR, England
ZF1CW—Via W0CW, 9731 Sagamore Road, Leawood, KS 66206
ZF1DB—To K0VVO, 3616 South 101st. St., Omaha, NB 68124
ex-3D2AJ—c/o 9H1EY, Villa Earland, Gharghur, Malta
5B4EC—Via OE3OHA
5N2ESH—To WA5ZWC, 5027 Braesheather, Houston, TX 77035
5V4AH—c/o DL1HH, an Der Bahn 5, D-6236 Eschborn Niederhoechstadt, Germany
5W1AU—Via W6KNH, 42 Donald Drive, Orinda, CA 94563

7X5AB—To W2KF

8P8A—c/o WA4RRB, 50 NW 189th Terrace, Miami, FL 33169

9H1DZ—Via A. Stabusch, Holbeinstr. 5, D-2000 Hamburg 52, Germany

9H4L—To W3HNK, P.O. Box 73, Edgemont, PA 19028

9J2YL—c/o W3HNK, P.O. Box 73, Edgemont, PA 19028

9L1AP—Via I3SCO, Via Roma 31, I-34071 Cormons, Italy

If you are a DX station looking for a QSL Manager, Clint Aberly, K5JBC, is offering his services. Clint's QTH is 105 Cherry Laurel Drive, Covington, LA 70433.

73, John, K4IIF

Awards *(from page 81)*

Ultimate Achievement Award: This one is issued for the ultimate in achievement and those that attain it will be the ultimate class of Amateur Radio Operators. This Award issued for attaining the goal of 250 or more Award certificates. You must have the other certificates or endorsements. Price $2.00. For these Awards apply to: The Amateur Radio Achievement Club or The Amateur Radio Club of Florida at 1851 66th Avenue N., St. Petersburg, Florida 33702.

Zone 29 Award: The Zone 29 Award is issued by the West Australian Division of the Wireless Institute of Australia to licensed amateurs and SWLs throughout the world. To qualify for this Award, the following conditions must be satisfied:

1. Establishment of two-way communication with any twenty-five different Amateur stations situated in Zone 29. Such communication to be made after 0001 W.A.S.T. January 1952.
2. The total of 25 different stations may be obtained by operation on one or more of the amateur bands.
3. Any type of emission which is permitted by the local licensing authority, may be used.
4. The Certificate will be endorsed when issued as confirmation of the fulfillment of the following special conditions:
   a. All 25 stations obtained from operation on one band only.
   b. All 25 stations obtained from operation of phone transmission (SSB—AM—FM—etc.).
   c. All 25 stations obtained from operation of CW transmission.
   d. All 25 stations obtained by one band operation and phone only.
   e. All 25 stations obtained by one band operation and CW only.
   f. 25 stations heard by S.W. Listener, in a-e of above.

Confirmations in writing of all contacts, together with $1. (Australia) or 5 IRCs must be submitted to: The Secretary, W. I. A. (W.A. Division), Box N. 1002, G.P.O., Perth, W.S. 6001. (Their official station is VK6WI).

NOTES

As I write this, *many* County Hunters and their families are enjoying their 4th of July weekend at the Annual MARAC-ICHN Convention in Rochester, Minnesota.

Here is something received from Jack Adams, W4NOK which I feel needs printing: "76", *God Bless You,* "Dear friends of mine, there is no way . . . In which I could address you . . . With more sincerity of heart . . . Than just to say God bless you . . . My words could wish that all your cares . . . Would be a little lighter . . . And I could send you greeting cards . . . To make your hours brighter . . . My lips could call good luck to you . . . Or whisper happy landing . . . And I could promise you the depth . . . Of faithful understanding . . . But I am sure no other thought . . . Or message would impress you . . . As lovingly or lastingly . . . As asking God to bless you . . . And so I say God Bless You, Friends . . . In every good endeavor . . . And may His guiding grace be yours . . . Forever and forever".

There is no way that I can top that, so I'll close. How was your month?

73, Ed., W2GT.

HAM SHOP

FREE TO CQ SUBSCRIBERS

Advertising Rates: Non-commercial ads are 10 cents per word including abbreviations and addresses. Commercial and organization ads are 35 cents per word. Minimum charge $1.00. No ad (non-subscriber) will be printed unless accompanied by full remittance. Free to CQ subscribers (maximum 3 lines per month). Recent CQ mailing label must accompany ad.

Closing Date: The 10th day in the third month preceding date of publication. Because the advertisers and equipment contained in Ham Shop have not been investigated, the Publisher of CQ cannot vouch for the merchandise listed therein. Direct all correspondence and ad copy to: CQ Ham Shop, 14 Vanderventer Ave., Port Washington, New York 11050.

---

2 METER CRYSTALS available direct from American Manufacturer for Clegg, Drake, Genave, Gonset, Heath, ICOM, Kenwood, Midland, Regency, S.B.E., Standard, Tempo, Trio, Varitronics, VHF Engineering, Wilson, Yaesu and more. Call us toll-free 800-228-2702 and charge it on your bank card or mail us a check or money order for $3.95 each plus 50 cents handling. Custom Crystals Inc., 7616 Burlington, Omaha, NE 68127.

WANTED Keys and Bugs for my collection. Bobby Brown, 509 Franklin, Toronto, OH 43964.

QSL CARDS: Printed Sample 20 cents. Print Shop, P.O. Box 13, La Grange, Illinois 60525.

FOR SALE: New Never opened Henry 3KA Linear $1295.00. Also like new Temp 2020 with matching VFO and speaker original boxes. Call after 6 PM (201) 573-1234, Ray, K2BBC.

FOR SALE: From Ham Estate. Set of QSTs, Complete Years — 47-50, 52-55, 59-76. Incomplete years 39, 40, 46, 58. Immaculate condition. Offers to Doug Holeton, VE6AGV, 4003 — 1st Street NW, Calgary, Alta, Canada.

SELL: VO2 Car Lic. Plates $30.00 each. Stan Parsons, VE1RY, 144 Sussex Dr., Riverview, N.B., Canada, E1B 3A7.

TECH MANUALS for Govt. surplus gear — $6.50 each: SP-600JX, URM-25D, OS-8A/U, TS-173/UR. Thousands more available. Send 50 cents (coin) for 22-page list. W3IHD, 7218 Roanne Drive, Washington, DC 20021.

WANTED!!! Johnson SSB adapter (any condition) for Johnson Viking Valiant transmitter and Technical Materials Corporation SSB adapter - model GSB - 1. Call 201-477-4096 or 201-363-2853.

FREE Catalog. Solar Cells, Nicads, Kits, Calculators, Digital Watch Modules, Ultrasonics, Strobes, LEDS, Transistors, IC's, Unique Components. Chaney's, Box 27038, Denver, Colo. 80227.

SELL: ROBOT 70A monitor, 61 viewfinder, 80A camera with 25mm 1.4 lens, 8 and 15 foot camera cables. Original cartons and instruction books. Recently factory calibrated. $500. Gordon Buckner, W0VZK, Box 721, Marshall, MO 65340.

28KSR TELETYPE for sale. $500. Dean Chandler, 5116 South Woodlawn Avenue, Chicago, Illinois 60615 (312) 643-3353 anytime.

QSL — Want to increase your QSL Collection? Join the Cornpatch QSL Club of the world. 807 N. Court St., Toledo IA 52342.

FOR SALE: Spectra Physics 137P 2mw laser tube brand new never used $80. G.R. 572B 1 KHz Hummer $15. Irwin Math, 320 Northern Blvd., Great Neck, N.Y. 11021.

MAGAZINES FOR SALE: CQ/73/QST/HAM RADIO, issues at 20 cents each (including USA shipping) from Lockheed Ham Club, 2814 Empire, Burbank, CA 91504. Send list and check. Available issues and any refund due will be sent promptly.

LOOKING FOR old Lionel trains. Interested only in "O" gauge, excellent to like-new condition. Primary interest is locomotives prior to 1952, but will consider any complete sets or more recent models. Am willing to buy outright for cash or swap radio gear to meet your needs. Write Dick Cowan, WA2LRO, c/o CQ Magazine, or call 516/883-6200.

MEDICAL: Any licensed amateur radio operator in the medical or paramedical field should join MARCO (Medical Radio Council) Contact: Stan Carp, M.D., K1EEG, 44 Main St., Saugus, MA 01906. (617) 233-1234.

WANTED: Extra coils for SW-3 receiver. I have odd-ball coils and need your single extras to make up complete set. Buy or trade. Bill Orr, W6SAI, c/o Eimac, 301 Industrial Way, San Carlos, CA 94070.

SALE: Atlas 210B complete with 110/220 V AC Console. Excellent condition. $550 PP. With mods (R.I.T., etc.) as per my Feb. CQ article and latest factory updates. Great rig. Only reason for sale is that am now in CN8 and CN8 will not issue license. Schultz, K3EZ Box "L", FPO New York 09544.

SELL: 4-1000 A used, $30. Raytrack kw plate tank coil for 80 & 40 plus kw bandswitch $16. UTC S-50 6KV c. t. 300ma, new, pick-up only, $75. OZ — PAK small (2kw) $20. R. Ross, 95 Norwood Ave., Northport, N.Y. 11768.

SALE: Heath IM-28 VTVM Kit. New Perfect. Ordered by mistake. $40. Schultz, Box "L", FPO N.Y. 09544.

THE BOOK "CQ YL" has been updated again with a new supplement bringing the YLRL Officers section up to date through 1977, plus a report on the 7th International YLRL Convention held in Houston in June '76. If you have a copy of "CQ YL" and would like to add the new supplement (the pages are "slotted" so they can be inserted into the book's spiral backbone), drop a note with your request to author/publisher W5RZJ, Louisa Sando, 9412 Rio Grande Blvd., N.W., Albuquerque, N.M. 87114. Please enclose $1.00 to cover cost of printing and mailing. The one and only book about YLs in ham radio, "CQ YL" contains 23 chapters, over 600 photographs. Order your autographed copy, or a gift copy, from W5RZJ, $3.50, postpaid.

WANTED: Antique glass — Looking for old milkglass - purple, slag, carmel and greentown Tell me what you have. I pay the highest prices. Write: Jack Schneider, c/o Cowan Publishing Corp., 14 Vanderventer Ave., Port Washington, N.Y. 11050.

FOR SALE: Three G.E. Bound volumes plus spare issues of G.E. Ham News, from Vol. 1 No. 1 to Vol. 15 No. 6. This is from May-June 1946 to Nov.-Dec. 1960 and includes index and supplemental information, $30. A. Dorhoffer, K2EEK, CQ Magazine, 14 Vanderventer Ave., Port Washington, N.Y. 11050.

SSTV AND PHOTOGRAPHERS — Make offer — 1 each like new — Fujitar lenses - 135 mm f 4.5 - Telephoto, 35 mm f 3.5 - Wide angle. Cary Cowan, c/o CQ Magazine, or call (516) 883-6200.

WANTED: SBA-301-2 optional 400 Hz crystal filter and SB-600 speaker/cabinet for Heath SB-303 receiver in new or mint condition. M. Godwin, W4WFL, CQ Magazine, 14 Vanderventer Ave., Port Washington, N.Y. 11050.

WANTED: Drake SPR-4 in top condx. WA1-POJ, 46 Broad St., Warren, R.I. 02885.

SELL: (40) G.E. 2400 Mfd. 375 volt computer grade capacitors $3.00 each. SWAN 350, Swan 117-C Pwr. supply, model 412 DC. PTT mike. Fine condition. $385.00 or trade for 500C or 700CX. Buy: Telephoto lens for Minolta SRT-101. Paul C. Gutz, K0TDO, 511 South 13th St. Fort Dodge, IA 50501.

WANTED: Hy-Gain Hy-Tower 18 HT Vertical antenna. A.M. Fox, W0EE, Box 895, Greeley, CO 80631.

SWAP 1920's and 30's QSTs for 1st 6 issues CQ, 1945. Don Erickson, 6059 Essex, Riverside, Calif. 92504. 714-687-5910.

KEYERS by N4BP: Micro-TO Mk II keyers, CMOS logic, battery powered, $28. Accu-keyers, TTL logic, AC powered, dot and dash memories, Auto-character space, $38. Accu-memories, 4X512 format, programmed by paddle, with display, $128. Less display, $100. All new. Immediate delivery on keyers; write for delivery time on Accu-memories. Bob Patten, N4BP, 2311 Nassau Dr., Miramar, FL 33023.

SELL — All New parts for WA4DSY Synthesizer, $75, Shipped. WA9WDB/5 John Teles, 10511 Tenneco Dr., Houston, TX 77099.

SELL: 2 Mtr. F.M., Lafayette HA-146 (see catalog for '77) $185 — J. Iuliano, RR2 Circle Dr., Coventry, RI 02816.

WANTED: One or more Motorola HT200 in 160 MC Band. WA7ZOO (406) 543-7006.

SALE: Shure microphones model 300 gradient $100.00. 55S $40.00 Model 15 Teletype $25.00. Toivo A. Rae, W2JGF, 5 Oakbrook Rd., Ossining, N.Y. 10562.

PLEASE HELP: have Johnson Viking II Catalog No. 240-102, S.N. 11385 and would like to borrow or buy instruction manual. Would also like to buy Vibroplex. Marvin C. Marlin, P.O. Box 501, Wynne, AR 72396. 1-5 [illegible]-238-8305 (Nites).

SELL: KW Components and Plate Xfmrs 3600-0-3600 at 1 amp $50, with 110/220 pri, 2 Amp $80. Paul Bittner, W0AIH, 304 W. 17th St., Grand Island, NE 68801.

SELL: Sonar 3601, 2 Meter, 8 Channel, mint condx, Fully crystalled plus sonar 2923 A.C. PS. Best Offer. W4MGL, 7010 SW 16th St., Plantation, FL 33317 (305) 792-4600.

Hallicrafters SX-101A Rcvr. Good Cond. Johnson Viking II, Good for parts - Sell or swap for Drake C-4. J. Domanski, 11310 S. Hamlin, Chicago, IL 60655.

FOR SALE: Heath SWR meter HM-15 $15.00 Ameco (Nuvistor) 6M converter kits @ $10.00 Heath 2M Converter SB-300-3, Heath 6M Converter SB-300-4 $9.00 each. Navy ARB Rcvr. 190-9 MHz with controls/cables $10.00 Pick-up only. Bethpage, N.Y. (516) PE1-3868

SELL: Heath HW7, $45.00, Hallicrafters S107 General Coverage Rcvr. $75. Both very good condition and P.P.D. Joe Pluth, WB9JHS, 7720 W. 162nd PL, Tinley Pk., IL 60477.

YAESU FT101 with Fan, Manuals. Factory installed rcvr. improvement and 160M mods. $500 incl. mailing. Jack Corson, N1DX, Box 25913, APO San Francisco, 96230.

FOR SALE: Drake R4C with Noise Blanker $400. Clegg Zeus, Mint Cond. $225. You Pay Shipping. D.R. Vore, WA8MPW, 665 Hillside Rd., Seven Hills, OH 44131.

NUMBERED HAM SENTENCES in 54 languages for your outgoing DX QSLs! K3CHP's DX QSL GUIDE, $3.95. Joe Mikuckis, 6913 Furman Pkwy. Riverdale, MD 20840.

YAESU FTDX-100 5 Band SSB Transceiver. Built-in AC/DC PS. Matching speaker included. $300 UPS paid. T.N. Colbert, 1008 Englewood Dr., Parma, OH 44134.

SELL: Swan TV-2 Transverter (144-148 Mz.) W/10M Crystals. $190.00. Heath H10-B rcvr. $60.00. Both mint condx. W/manuals. Huland Gardner, WB4THL (919) 243-2555. Rt. 4 Box 250, Wilson, N.C. 27893.

WANTED - SPC-10 S.B. Converter also Crystals in 243 holders 2 to 7 meg. Harry Glawe, W0JOL, Dana, IA 50064.

WANTED: 160 CW Rig - Also self powered VFO. Eric Palmer, W2RD, 1602 Mermaid Ave., Brooklyn, N.Y. 11224.

LINEAR BUILDERS - Send SASE for list goodies and Hi-power stuff. Mace, 8600 Skyline Dr., Hollywood, CA 90046.

REGENCY HR-2, Good Condition, Various Xtals, $140. Craig Bradley, WA4MRQ, 1226 8th Ave., S.W. Alabaster, AL 35007.

NEED: 902A and 3MP1 scope tube, Also 28 model reperf., DX60B Heathkit transmitter, Collins 32S — gear. Dick Dawson, W7GPP, 1308 F St., The Dalles, OR 97058.

FOR SALE: Telrex II Element 6 Mtr. Beam $30.00, Monitoradio DR-200 (30-50 & 152-174MH.) Nutronics Hustler Whips 80 thru 15 mtr. $30. All excellent Cond. Prices FOB. T.K. Brown, W3CUH, RD 1 Box 102, Forksville, PA 18616.

WANTED: Preamps/Janel 144PB/432PA (W6-RQZ) 1330 Curtis, Berkeley, CA 94702.

WILL TRADE: Lafayette tube recv. HE-90 or HA-460, 6M transceiver (both mint) fpr Knight R-100. Also want J-38 key. Will answer all letters. Allen N. Purcell, 10476 Akron Rd., Marshallville, OH 44645.

EICO 720 cw transmitter 100 watts 80 thru 10 with manual & relay $60. Robert F. Voelker WA2PCL, 101-23 Lefferts Blvd., Richmond Hill, N.Y. 11419.

WANTED: Regency Converter Model ATC-1 for mobile use. Any condition. Phil Pichette, VE7ADW, Box 183, Salmo B.C. Canada, VOG IZO.

FOR SALE: Complete Robot SSTV station, 70B monitor, 80A camera with macro lens, cables, books, calibration tapes, menu board, etc. Mike Ludkiewicz, 143 Richmond Rd., Ludlow, MA 01056.

FOR TRADE: R-390 Excellent Condx. W/ matching TX T-368, Original price $13,500 Trade for KWM-2 W/306-1 or 30S-1 pick-up or you ship. Gerald L. Myers, 4417 E. Ash Ave., Las Vegas, NE 89110. (702) 452-3907.

USED CODE PRACTICE TAPES (Cassette) wanted by slow amateur (need 6-20 w.p.m. Contact Richard Rystrom, 254 Hylo Rd., S.E. Salem, OR 97302.

FOR SALE: Crystals for Drake TR-22/ 147.06 - 147.66/ Will sell for $2 ea. or trade for 146.22 - 146.82. WA7WXQ Doug Des-Enfants, North Star Rt., Torrington, WY 82240.

SB-104 mint $500 SB-401 with xtals $225 CL-36 $70. Todd Dagney Jr., K4QDK, 8635 Fieldcrest Rd., Richmond, VA 23235.

FERRITE BEADS: Lowest Price in the country and on SALE 20 for $1.00 w/spec. sheets. Please add 25 cents for P&H on orders under $5.00. Todd Gorlin, 4829 Buchanan St., Hollywood, FL 33021.

WANTED: DAVCO DT-20 Transmitter unmodified with manual. Heinlein, 107 Wyoming, Boulder City, NV 89005.

HEATH AF-1 Audio Frequency Meter $18, Yale wall safe 1 cu/ft. $25. Motorcycle radio FM 30-50 mc as is $5. K6KZT, 2255 Alexander Ave., Los Osos, CA 93402.

WANTED: SSB Exciter W/VFO for 15 and 20 meters. Quick Cash! Consider Low Power SSB transceiver. Troy Weidenheimer, 103 Log Trail Dr., Ballwin, MO 63011.

WANTED: 12' folding LINKBOAT with square stern for use with outboard motor. Heinlein, 107 Wyoming, Boulder City, NV 89005.

SELL: MFJ Speech Processor LSP 520 BX II Excellent condition $45.00. Electro-voice 619 Dynamic Hiz Mike Excellent condition $18.00. David Schwartz, 1183 Southeast St., Amherst, MA 01002.

HT-40 & VFO, HE45b & VFO, S-108 & filter, Bug, QF-1 Scott, S.W. Adapter $20. or trade transceiver and cash, A.S.G. 2500 Gehb Ave., Baltimore, MD 21227.

UNIVERSAL Q.S.L. and DX cards needed. Send Q.S.L. and DX cards to Philip Steven Kurland, 357 East 201 St., Apt. 1-F, Bronx, N.Y. 10458.

SELL: Original Heath AT-1 Xmtr.; AC-1 Ant. Coupler; VF-1 VFO. Xmtr./Coupler Manuals $80. Krawetz, 654 Barnsley, Sunnyvale, CA 94087.

N.R.I. COLOR TV COURSE with color TV $140. North Radio, 152 RTTY Convertor $25. T282 C 100W Xmtr. 200 to 400 MC $75 J. Murray, W4ONN, 265 N.E. 173 St., North Miami Beach, FL 33162.

WANTED: Opr./instr. manual for RCA O'Scope Model WO-91A. Copy OK. State your price. Merton Ward, 52 MMS Box 1759, APO, N.Y. 09123.

Attention: Receiver Drake 2-C, for sale, rare serial number, for collection, serial number 0001 would consider any proposal. Pierre Gagnon, 678 Bastien App. 3, St. Jerome Cte. Ter. P.Q. Canada J7Y2X8.

WANTED: Heath or Waters Phone Patch, Johnson 250 or 1000 W Antenna Tuner with meter. W0AIH, Paul Bittner, 304 W. 17th, Grand Island, NE 68801.

SELL: Swan 250C - 117XC - TV2B - VFO 210 - NS-1 Excellent with manual $650.00 FOB. Tony Slapkowski, K4AWS, Box 15. Sumterville, FL 33585.

TS-820S - Digital readout factory installed. With CW filter & optional speaker. Brand new, factory sealed cartons. Total price - 1,067.00 plus shipping. K3UKW, Tony (215) 271-8898

BRAND NEW - Sealed Box Bearcat 210 Digital readout scanners - covers all public service bands and 144 &450 amateur bands AC & DC power supplies built in. (215) 271-8898. Send $268.00 cashiers check, or money order. Anthony Musero, K3UKW, 1609 S. Iseminger St., Philadelphia, PA 19148. Shipped in USA postage paid . . . UPS.

WANTED: Harvey Wells VFO for TBS-50. Clarence Page, 12844 2nd Ave., Hanford CA 93230.

MANUALS WANTED: for Jerrold 900A sweep, Fluke 407D/DR pwr supply, Trio Labs 120-7 RMS VM, NLS 484B DVM. Will buy or trade for HP manuals. PHD, 5220 Carlingford, Riverside, CA 92504.

WANTED: II meter VFO's High power 6 meter transceiver: Monitor Scope, Freq. Counter. For Yaesu 101B. Best Offers - No Junk. Tom Corrado, WB2KBC, 38 Urban Dr., Selden, N.Y 11784.

NOVICE/TECHNICIAN crystal list for SASE. E. Taylor, W6DOR/W7BYF, 2921 Loyola Dr. Davis, CA 95616.

FOR SALE: 1 Prop-Pitch motor (Large) in case F.O.B. (Converted) James T. Johnson, 815 Coleman St., Raleigh, NC 27610.

FOR SALE: RCA Dynamic Transistor FET Tester type WT-524A $115.00. RCA Color B&W Picture Tube Tester type WT-509A $80. Hickok - Mutual Conductance Tube tester Model 6000A $50. William D. Shevtchuk, 1 Lois Ave., Clifton, N.J. 07014.

WANTED: 4CX250K (W6RQZ) 1330 Curtis, Berkeley, CA 94702.

YAESU FT-101 with Fan, Manuals, Factory installed rcvr. improvement and 160m mods. $475 postpaid. Jack Corson, N1DX, Box 25913, APO San Francisco CA 96230.

SELL: Heath HW-22A & D.C. P.S. $110. Clem K8HWW, 33727 Brownlea, Sterling Hts. MI 48077.

HEATH HR-10 RX X-cal, spkr, man.; like new; you ship or pick up. $50. J. Imig. U-196, 212 Prospect, Bloomington IL 61701; (309) 663-4201.

FOR SALE: 3 section (66 feet) steel broadcast tower. Triangular, 40" Face. Steps. $350 K. Palmer, K2FJ, RD 2, E. Aurora, N.Y. 14052.

R-392/URR, Manual, Pwr. Trans. $169 FOB. Mike Bae, Box 246, Flagtown, N.J. 08821.

VIBROPLEX $20; MN4 $80; PS 150-12 DC Pwr; $50; Swan 14x module $30; EV611 mike $20. Waters coax switch $10; 2KVA Variac $20; FOB Art Ford, 56 Gildare Dr., East Northport, N.Y. 11731.

WANTED: Set of Matched 7094's for HT-41 Linear. Ralph J. Volpe, WB5YXP, 3333 Weir Ave., Lot 100., San Antonio, TX 78226.

FOR SALE: Heath DX60B & HG10B, Collins 75A2 & 32U1; Swan 350 AC/DC. Spkr, Clegg FM27B, Regency HR2B with TTP & 7 sets crystals, 2-HRT-2 Handis, One has case, nicads, charger ext mike, 5 crystal sets. More 2 MFM gear. After 6PM EST WA1VJZ, Joe Leal (203) 347-2407.

HEATH; HW101, HP23 supply, SB600 spkr, HM102 pwr mtr., turner mic., vy Gd Cond. W/mans. $285.00. Dan Lester, Rt. 1, Box 111 Seymour, WI 54165.

DRAKE OWNERS: Obtain much greater average voice power with any Drake transceiver/Transmitter using the AC-4 Supply. No internal mods, compression, linear or tube substitutions needed. $2 and S.A.S.E. WB2IWH, 213 Dayton Ave., Clifton, N.J. 07011.

SELL: Drake TR-4, AC-4 and DC-4 power supplies $450.00. Paul R. Loafman, K5BPY, 2101 South Rankin, Edmond, OK 73034. Phone (405) 341-7501.

WANTED: Radio Boys, Radio Girls, other juvenile radio books. W6CF, Box 473, Redwood Estates, CA 95044.

DONATION WANTED for Korean Amateur Radio League. Any ARRL publications: 75, 76 Handbooks etc. M. Bae, Box 246, Flagtown, N.J. 08821.

SALE: GBC Model CTC 3000 TV Camera with 25mm 1: 1:8 lens used 2 hrs. mint $165.00. Gerald R. Tetrault, 1369 Front, Manchester, N.H. 03102.

WANTED Allied rcvr. SX190 or Allied General coverage rcvr. Jim Hall, W4BLX, Rt. 3 Box 281A, Staunton, VA 24401.

UHF EQUIPMENT: Scanners, Mocom/70 & Micor xcvrs, URR-35C, TRC/8, RCV & XMT, Sell or trade, Fox, WA2WYH, 1458 Ocean Pkwy, Brooklyn, N.Y. (212) 998-7658.

WANTED- Master Crafter or similar model 12" G.M.T. clock with cities on face. Ernest Place, 760 E 9th SP 37, San Bernardino, CA 92410.

FOR SALE: Ideal vacation or retirement lot for some Ham. High location makes near ideal antenna site. Good fishing and camping at nearby lake Ann. Country club and town nearby. In the Ozarks of Northwestern Arkansas. Send SASE for inquiry to: WA5CNG, Al Springer, 411 E. Highland Dr., Kilgore, TX 75662.

ADVERTISER'S INDEX

New Reader Service System

To speed information to you on products shown in CQ advertising, a new computerized Reader Service System has been designed. For additional information on a particular ad in this issue, tear out the Reader Service postcard bound between pages 72 and 73, and circle the numbers on the card which correspond with the Reader Service numbers listed in the advertiser's index below. DON'T CIRCLE THE PAGE NUMBERS! Fill in your name and address, and mail. We'll have your information on the way in short order.

Contest Calendar *(from page 84)*

7. It is suggested that during the period that JA's are coming thru on 75 Phone, that 3793 to 3802 kHz be treated like a "DX Window" and kept free of other operation. The JA's are limited to this narrow band, work them split-frequency.

It's not necessary to use official log forms but it is desirable, especially the summary sheets. There is still time for state-side stations to get a supply. A large s.a.s.e. with sufficient postage and IRC's are requested.

Mailing deadline for your phone log is December 1st, and January 15th for the c.w. section. They go to: CQ World Wide DX Contest, 14 Vanderventer Ave., Port Washington, L.I., N.Y. 11050. Please indicate Phone or G.W. on the envelope.

Zero Bias *(from page 5)*

meeting in Washington between the FCC and members of the amateur radio media, a "point of sale" inquiry was brought up whereby people buying amateur radio equipment must supply a license to the dealer in order to purchase equipment was brought up but there was no actual way for the FCC to enforce an idea such as this.

To reiterate, for a moment, we are talking about many types of interference, basically r.f. We are not trying to pinpoint the actual causes, and they are many. But the type of interference we are talking about cannot be controlled by the installation of a typical low-pass filter on your transmitter . . . not even if it cut off everything up to 500 MHz.

What we are facing then is stringent regulation now on amateur equipment in order to combat a serious situation. Since it appears hopeless to regulate the CBer or to encourage enforcement of existing legislation regarding the use of linear amplifiers by whatever number of CBers who feel the need of them, it will then follow that the restrictions will then fall primarily on the amateur. This will have the salutary effect of cleaning up possible interference that we cause and in general give "Mr. and Mrs. America" a little less to complain about. CBers who obtain future amateur equipment to use illegally will also produce less interference. However, the cost that we will all be paying for this new equipment will be considerably higher in terms of dollars. Some manufacturers claim the price increases needed to accomodate these new criteria will range from one third to double the price you are now paying. All this will not stop the problem. Probably this will only make older and more obsolete equipment more desirable and produce a greater used equipment market at the expense of the current amateur radio manufacturing industry.

One solution has been brought forward in the form of a Senate Bill S. 864. This Bill has been introduced by Senator Barry Goldwater and requires that manufacturers of all types of home entertainment devices be subject to FCC type acceptance before they can be sold. Type acceptance insures a suitable electrical-electronic-mechanical design to make the device immune to interference from r.f. fields of other services, namely amateur and CB. This bill needs our support, not just lip service. I urge you to write to your Senators asking their support of this important Bill. I also urge you to write to the Senator who is heading up the committee looking into this Bill. Write to:

Senator Ernest F. Holling,
Subcommittee on Communications
U.S. Senate
233 Russell Bldg.
Washington, D.C. 20510

We need passage of Senate Bill S. 864 as a start to control the problem of interference from both sides.

What we seem to be buying with all of these measures is time. We are in fact trying to preserve the future for all of us both amateur and CBer alike. We are even trying to let "Mr. and Mrs. America" get a little enjoyment from their super whatever. This will in no way clean up the problem immediately nor prove to be a quick solution that will please everyone. It will not even end the interference problem in quick order. But, in the long run it will.

We still have countless millions of transmitters and home entertainment devices out there that won't be subject to these new regulations, whatever they may be. They will have to take their natural course in becoming obsolete, wearing out, or breaking down beyond repair. In this slow phasing out process, equipment will be replaced by newer, better designed gear not susceptible to the interference problem we face now. It can work, if you want it to.

Another Type of Interference

It seems that there is some sort of rift between truckers and CBers occuring and their use of the 40 channels. Evidently the truckers, who apparently are the CB trend-setters, want some clear space to operate and handle their own traffic (no pun intended). It appears that there now exists a "National Trucking Intercom Channel" on of all places 147.57 MHz. There are also hundreds of truckers across the country using 146.58 MHz. to handle "Smokey Reports" and truck-stop info. Some truckers are even using amateur call letters gleaned from the broken sequences in *The Callbook*. They obviously have no difficulty in obtaining equipment and no moral or ethical difficulty in using it.

We amateurs have a long time reputation for policing ourselves and taking care of our own business. There must be some sort of legal recourse to end this incursion into the amateur radio bands. As a logical extension to this situation, it won't be too long before thousands of CBers join the trucker's ranks on two meters.

We can and should close down repeaters when used illegally, it means more repeaters going PL to keep these illegal operators off the air. It doesn't mean deliberate jamming of their broadcasts or doing something just as illegal for whatever "moral" reason. I'd be interested in what you think of this problem and some possible solutions you might have.

73, Alan, K2EEK

Spread The Word

An eye-catching bumper sticker encouraging the man in the street to "Talk to the World-Become A Ham Operator" is available from CQ for 25 cents plus a legal-size s.a.s.e. Quantity prices upon request. Write to: CQ Magazine, 14 Vanderventer Ave., Port Washington, NY 11050.

Wilson HT Modifications *(from page 47)*

through the case, and the pad epoxied into place. The terminal pins should be bent over at right angles to clear the battery pack. Mounting and wiring the TT circuit is admittedly tedious due to the cramped quarters and easily-damaged components—so take care!

External Microphone

An external mike (Though not necessarily an external *speaker*/mike) is a virtual necessity if the unit is to be operated mobile. This should be a high-quality, low-impedance P-T-T unit (No Power Mikes!). At W8LYF, I use a Heath Micoder as an all-purpose mobile mike and back-up touch-tone encoder; this makes a fine external mike for the Wilson if the Micoder—which is designed for high impedance mike inputs—is modified for low-impedance use. This can be done by replacing C-114 by a 10K-OHM resistor and carefully readjusting the Micoder output level control R-122 for proper deviation and touch-tone quality. Once this mod is made, the Micoder's mike and tone generator have plenty of output to drive the Wilson's audio input stages very nicely. The mike's hot lead, P-T-T lead, and ground circuit are, of course, connected to the proper pins on the "multi-function jack" on top of the Wilson's case, as described in the instruction book (At least two different types of connectors have been used on different production runs—consult your owner's manual for the proper pin connections).

A suggestion: As the Wilson connectors are one-of-a-kind types which don't appear to be frequently used on other gear, use a mike connector that is compatible with your other f.m. gear and install an in-line connector in the lead connecting to the Wilson. This will allow inter-changeability of mikes with your other equipment. Why tie up an expensive mike — particularly a useful device such as the Micoder—to only one unit? (I happened to settle on the 4-Pin "CB type" mike plug as it was the type used on my other two f.m. transceivers, a Multi-2000 and a Midland 13-505.

Incorporation of all these features may not be required or even desirable in all cases—it depends, of course, on individual preference and operating styles. Addition of the external power and speaker/headphone jacks, and the internal touch-tone pad and IC chip, do *physically* alter the unit which should be considered—I cautiously waited until the 90-day warranty had run out before digging in! Nevertheless, the features which were "Modded in" to the Wilson have added incalculably to operating pleasure and, in my opinion, the resultant H-T compares very favorably with Amateur and Commercial units in the $400-500 price class. ■

The SW-2 Receiver *(from page 22)*

panel assembly was found to provide insufficient shielding for a high gain circuit. In summation, broadcast receiver design was not compatible with shortwave reception.

These lessons were not lost upon the National Company. Even while the SW-2 was in production, the company was already at work upon a revolutionary new shortwave receiver for amateurs that would incorporate all the lessons learned from the first design. The new receiver was to be known as the National SW-3 and eventually over 10,000 of these receivers would be built, dominating the amateur receiver market for over a decade. But that was yet to come.

(Note: The author would be pleased to hear from anyone who owns an SW-2 receiver. W6SAI searched for one for years and finally found the one shown in the photographs. It is the only one he has ever seen.) ■

THE WORLD MAY ARGUE . . .
BUT THE UNITED NATIONS AGREES
ON YAESU, OF COURSE ! !

Photo shows the 100% Yaesu station recently installed at the United Nations Headquarters in New York City. Delegates and visitors use it for amateur radio contacts to their friends all over the world.

The United Nations Amateur Radio Station, K2UN, includes two FT-101E's, FL-2100B linears, SP-101PB speaker patches, FV-101B external VFO's, YC-355D counters, YD-844 desk microphones, FT-221R two meter all mode transceiver, and QTR-24 world time clock. Look for K2UN on the air and get one of their beautiful QSL cards!

A similar station is in operation at the International Telecommunications Headquarters in Geneva, Switzerland, with the call sign 4U1 ITU.

Yes, the world of amateur radio agrees, *YAESU IS THE RADIO.*

YAESU

The radio.

1077

YAESU ELECTRONICS CORP., 15954 Downey Ave., Paramount, CA 90723 (213) 633-4007
YAESU ELECTRONICS CORP., Eastern Service Ctr., 613 Redna Ter., Cincinnati, OH 45215

Save time, money and anxiety with EIMAC's 100 kV, long pulse switch tube.

EIMAC's new X-2062J ceramic-metal tetrode switch tube is admirably suited to the tough service involved in high voltage, high current, long pulse operation.

Look over these outstanding features:

1. High holdoff voltages—in excess of 100 kV.
2. High pulse current—85 amperes at a pulse duration up to one second.
3. Low internal tube drop at maximum current—about 2 kV. An ideal modulator.
4. Pulse rise and fall time easily adjusted. No deionization time to frustrate you.
5. Minimum sensitivity to load changes. Short or open circuit? High reactance? The X-2062J accepts these burdens in stride.
6. Fully responsive to load arcs. Rapid turn off time.
7. Fully effective as a combination modulator and regulator where high plate voltage is required.

Interested in this state-of-the-art switch and regulator tube for controlling neutral beams, megawatt radars or similar tough applications? Contact Varian, EIMAC Division, 301 Industrial Way, San Carlos, California 94070. Telephone (415) 592-1221. Or contact any of the more than 30 Varian Electron Device Group Sales Offices throughout the world.

varian